a journal for precision engineers and all users of industrial diamonds and other hard materials

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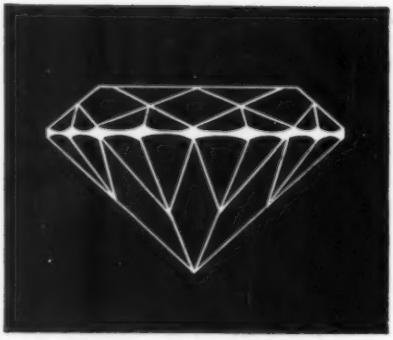

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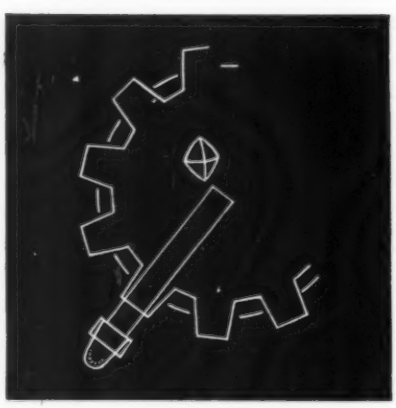

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## *Generally Speaking*

*Little but good*

The article to be found on a later page entitled 'Diamond Tools Safeguard Jobs' has an especial interest, as it tells of a small but enterprising firm which, by using up-to-date equipment and by undertaking short-run jobs that are uneconomic for the larger concerns, has found itself a prosperous niche in a world where there are all too few companies interested in the requirements of the small man. It is encouraging to see this sort of outlook, when so many of the larger firms are unnecessarily frightened by the apparent high cost of diamond tooling, and do not always understand that this high cost is more than offset by the economies that can be obtained in use. Not only does the long life of diamond tools effect an economy in itself, but their slow rate of wear means reduced down-time—an especially important feature in automated factories—and a reduction in the number of rejects.

*Missing or overdue*

There have been three large-scale thefts of industrial diamonds recently, with a total value of over a quarter of a million pounds. The lay press has advanced a number of theories as to the probable destination of these stones, and we do not propose to add our guesses to theirs. What we will say is that it seems highly probable that all three were connected, that they were planned by someone with a good knowledge of the trade, and that they were taken with a specific customer in view. Such quantities of stones would be difficult to dispose of on the open market without arousing suspicions, and it seems likely that they were stolen to order.

ADAMANT.

# *Application of Industrial Diamonds 1*

*by*

**H. J. Otterloo**

*Introduction*

It is a generally known fact that the proportion of diamonds used for industrial purposes has increased to over 80% of the total diamond production. However, in spite of the many different kinds and qualities of industrial diamonds, it is often difficult for diamond tool users to get exactly what they want. They have to rely on trusted suppliers who themselves find it difficult to determine exactly the type and hardness required. It is for this reason, as well as to improve techniques, that the performance of diamond tools should be studied; inferior results cannot always be blamed onto the supplier, as incorrect use can equally be the reason.

Owing to the shortage of practical information published on this subject, we hope a review, based on the performance of some of our tools, will be useful. Although other applications will be dealt with briefly, the emphasis will be on dressing diamonds for sharpening and profiling grinding wheels, and grinding wheels for hard metals. It has been possible over the last 15 years, in a moderately large factory and using an intensive control system, to gather a good deal of information which, it is hoped, will not only be useful but will convert others to improve their control systems. Rapid technical progress, of course, and new methods of production have often created problems of their own which have only been solved after much thought. Some examples will be included in these articles as they also should make interesting reading for other diamond tool users.

*Fig* 1. *A blast in the big hole of Premier Mine.*

*Fig.* 2. *Loading deep mined diamdiferous material at De Beers Kimberley Mine.*

*Diamond tools—general applications*

Selecting diamonds used to be difficult enough when it was only necessary to specify the mine and country of origin and whether it was alluvial or deep mined (Fig 1 and 2). Now with the introduction of synthetic diamonds this task will be even more difficult. Throughout the ages men have tried to make diamonds as well as gold and, as far as diamonds are concerned, they have now succeeded. Without dwelling on the subject, suffice it to say that the General Electric Company U.S.A.* fully deserves our admiration for this achievement, even though

* A number of other organizations, including De Beers, are now able to make artificial diamonds.

it creates more complications in our work. Some articles have already been published, but the question whether natural or synthetic diamonds are better has not been satisfactorily answered. Although not in a position to resolve the question, nevertheless, we hope in these articles, to throw some more light on the subject, and at the same time make clear how many factors have to be considered.

In order to gain a thorough understanding of diamond tools it will be necessary to start right from the beginning. The rough diamonds are first divided into gem stones and industrials; industrials are then further divided for various applications—*e.g.* dressing diamonds, diamond wheels, polishing pastes, special purpose turning chisels, hardness indenters, and gang saws and circular saws for marble cutting, etcetera. As dressing diamonds and diamond wheels make up a large part of the industry and are the tools we have most experience in, they will be dealt with most fully.

*Fig.* 3. *Diamond sorter at work at Kimberley.*

*The form and construction of diamond wheels*

It is not possible to go into every form, application, and machine. In a general survey, this would not be necessary to establish the factors that constitute a good diamond wheel. They are the same for all applications. Although sintering as a manufacturing process is outside our scope, it must be borne in mind that the grain size and uniformity are important. In Fig 5 it can be clearly seen that the uniformity of the diamond grains influence the grinding power to a large extent, the surface roughness, and the

*Fig* 4. *Sorted diamonds*

efficiency ratio. The efficiency ratio does not only indicate the length of life but also the quantity of tungsten carbide that can be ground in a given time. Fig 6 shows how the grains can

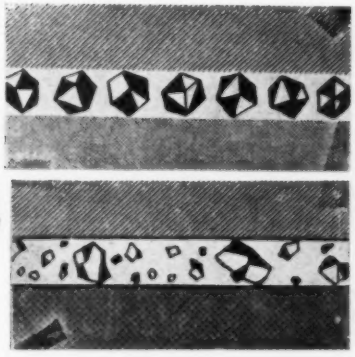

*Fig. 5. This illu tration shows ho diamond grains in fluence grinding.*

be separated into various sizes by sieving, although the finest grains can only be separated by elutriation. Once the best grain size has been

*Fig. 6. Sieving diamond grains.*

determined, the appropriate bond must be found. This can be difficult as there are so many applications, both new and old, to be catered for. It takes a lot of experience and experimenting to decide which bond will give the best result in a particular application. However, in this article, we hope to simplify the problem a little.

As a general rule, when fine grinding must be done with a surface roughness of 1 to 4 μ CLA, we prefer to grind with a resinoid bond. This does depend to a large extent on the type of grinding machine and also the cost of labour. When labour costs are high, a possible choice is a resinoid wheel with a coarse grain impregnation. In this case the wheel costs more as it wears more quickly, but it also grinds more rapidly. Thus it has a combination of high grinding power and a low efficiency ratio—the grains are pulled out of a resinoid bond more readily than out of steel or bronze. Tungsten carbide and ceramic bonds do not come within the scope of this assessment as they are only used for experimental or special purpose work. For practical purposes, steel, resinoid, and bronze bonds are used for normal grinding. Each factory must decide on which factors to place most emphasis.

*Fig. 7. A variety of grinding wheels.*

Fig 7 shows a variety of grinding wheels; in many countries these are covered by specifications and it would be worth doing the same in our own factory to cover the various requirements. The grinding power however, and the efficiency ratio is not only controlled by these factors. It is also influenced by the thickness and density of the impregnated section, *i.e.*, the amount of diamond in 1 cc (expressed in carats). Fig 8 illustrates this schematically. This is a very difficult factor to check and the integrity of the supplier has to be relied on. In the United States suppliers often give a guarantee certificate but we are not convinced that this is worth while.

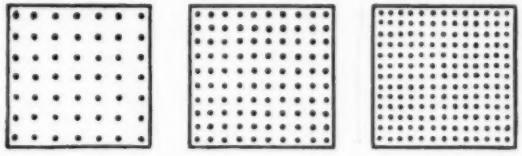

*Fig 8. Concentrations of diamonds in various grades of wheels.*

*How to use diamond wheels*

As we have seen, there are many factors that influence the grinding power and efficiency ratio, but they have all been the concern of the manufacturer. We have also mentioned that it is not always the manufacturer who is to blame for inferior results. If the performance of diamond tools is studied, it soon becomes clear which supplier gives the best results. However, a well made diamond wheel must be used properly and this is a point that is too often neglected. Because diamond is a difficult material most of the initiative is left to the operators and there is a reluctance to give them advice in case it is taken as a slur on their ability. Good advice is needed however and in practice is gratefully accepted. Let us therefore consider some of the factors pertaining to grinding tungsten carbide. When a diamond wheel is put to use, it must be assigned to a particular machine and not removed from it. In the universal grinding machine, this is not possible, but then the wheel is mounted on an arbor which should only be removed together with the wheel; thus disturbing the wheel is avoided. The wheel must be so adjusted that the axial and radial running keeps within a tolerance of 0.02 mm (see fig 9). The grinding machine should be of good quality and there should be no

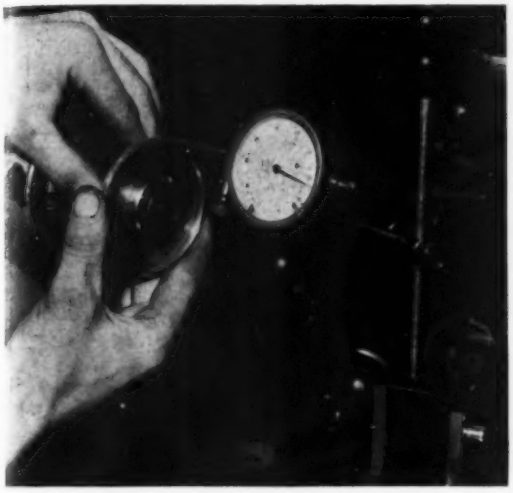

*Fig. 9. Adjusting the wheel for concentricity with a dial gauge.*

vibration or clearance in the bearings. The peripheral velocity should be 10 to 40 M/sec but in practice it has been found that good results can be achieved with lower speeds. The depth of feed can only be determined empirically, but in general it should not be higher than 0.005 to 0.01 mm. This is especially true of the universal grinding machine. The grain size is relevant here as a larger grain will permit a greater depth of feed. An incorrect depth of feed can not only damage the wheel but can be responsible for hair cracks or worse.

*Fig. 10. Cleaning a wheel by rubbing it on a plate covered with silicon grains.*

Whether to use wet or dry grinding is another important consideration. In practice wet grinding is more popular, particularly with a 'diamoil' solution. When we speak about a 'drip' apparatus we mean that a wick or some other method is used to meter the fluid. On machines that have a special cooling device, this presents no problem, but the universal tool grinding machine has no such device and consequently this problem must be overcome. It can be particularly inconvenient when a difficult grinding problem requires an unobstructed view of the work. A good and practical answer is mist coolant which will be dealt with later. Grinding with a coolant not only increases the grinding power but the efficiency ratio as well. Wet grinding also helps keep the wheel clean. This does not mean that the wheel does not need cleaning from time to time.

We are a little apprehensive of the cleaning operation but in fact it is quite simple if done correctly. A flat glass or cast iron plate is needed, in a wooden frame. The whole plate must have a closing lid. The plate should then be sprinkled with silicon grains size 120-180. Now the wheel should be pressed flat on this surface and rotated. The grinding surface will be both cleaned and levelled. This operation must only be performed when absolutely necessary as a good deal of diamond is lost. The resulting sharper grinding and good flat grinding edge however makes it worth while. Fig 10 illustrates this process—note the correct position for the hands. The body of the wheel is also important. In spite of warnings, manufacturers have been known to make it of aluminum and the wheels have soon needed renewing as aluminum will not stand up to maintenance. The body is also important as it can affect the true running of the wheel.

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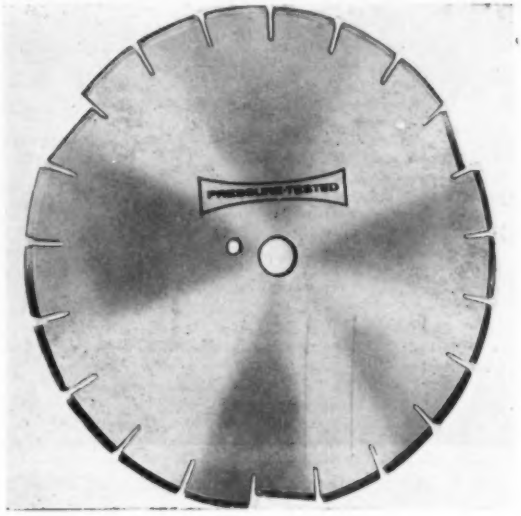
## *The Tru-Grit Rotary Dresser*

We are informed by L. M. Van Moppes & Sons, Ltd of Basingstoke, that they are distributors for the U.K. for the Tru-Grit Rotary dressing tool mentioned in the article appearing on pp 13-16 of last month's issue of Industrial Diamond Review, under the title 'New Form of Grinding, Cheaper, Faster, Closer' by H. E. Robison of the Wheel Trueing Tool Company, Detroit, USA, the manufacturers of the tool.

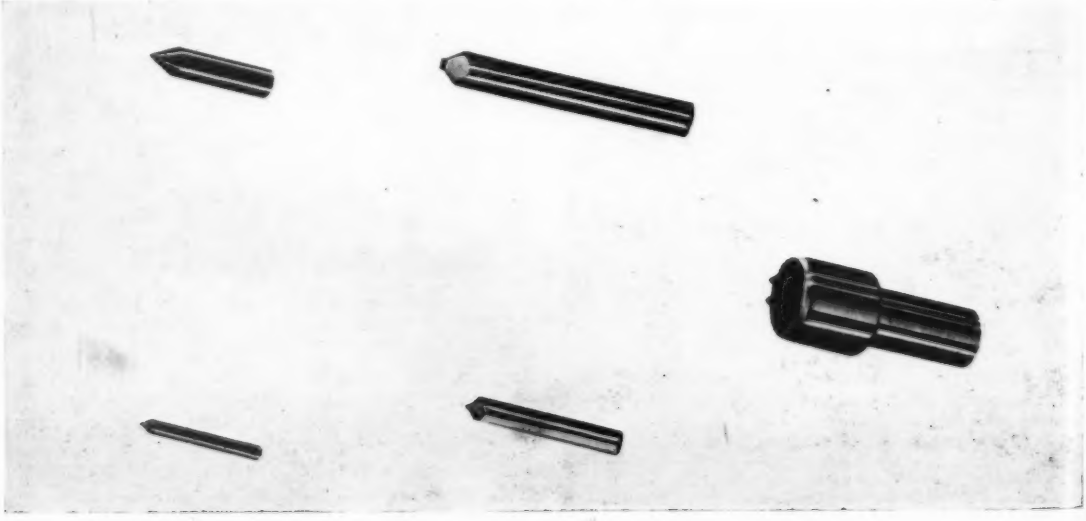
## *New Tungsten Carbide Bonded Diamond Saw Blades*

The Diamond Tool Research Co. has introduced a new series of diamond masonry and concrete saw blades. These blades are unique in that they feature both Pressure-Tested diamond grits as well as a tungsten carbide bond. Pressure-Tested diamond grits make an enormous difference in the ability of these blades to take heavier cuts, cut more footage, and to withstand greater working pressures. The use of tungsten carbide as a bond increases the efficiency of the blade by preventing the wearing away of the rim before the diamonds. The DTR diamond concrete saw blade embodies a special ' raker ' design built into the rim, which results in much faster cutting and eliminates undercutting by removing or ' raking ' out the chips of concrete. The masonry and concrete saw blades are offered in a variety of tungsten carbide bond types; there is a bond to fit every cutting job. They are available in all standard diameters and thicknesses but special sizes can be supplied.




## *New Expendable Diamond Dressing Tools*

The Diamond Tool Research Co Inc. claim that new savings and efficiencies in grinding wheel dressing are made possible by the introduction of their new NR series of ' non-resettable ' and expendable diamond dressing tools. Only the finest single point diamonds are used thus allowing for a maximum number of wheel dressings per tool. Turning the dresser at intervals helps generate the cutting point and prolong the tool life and point is used until entirely consumed. Low original cost makes it advantageous to use a new tool instead of resetting a diamond weakened by use and reset on secondary cutting points. Also it is possible to reduce inventory costs, since DTR maintains large stocks of these tools to ensure immediate delivery.



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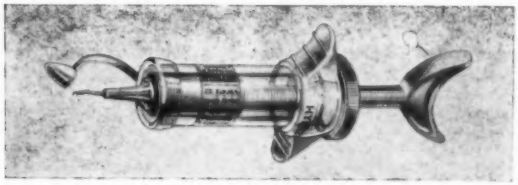
# *A New Dispenser for Hyprez Diamond Compound*

A new type of dispenser for diamond compound, a micrometer controlled syringe, known as the Hyplicator, has been introduced by Engis Limited, of Maidstone. To avoid contamination, by metal deposits, of the workpiece being finished, the body of the Hyplicator is made of moulded nylon. A threaded, moulded shaft engaging with a knurled micrometer screw—both of nylon—is in the top of the body. At the bottom of the screwed shaft, to force the compound through the nozzle, is a neoprene plunger. The base of the plunger has a curvature radius greater than that on the inside of the nozzle—to avoid any wastage of the compound. When a Hyplicator is empty the nozzle can be removed and screwed on to a fresh barrel, the old one being thrown away.

The syringe is for dispensing Hyprez diamond compounds which come in 12 different micron sizes, each with its individual colour as shown in the appended table. Between them, the compounds in this range are suitable for cutting and finishing on soft, hard and very hard materials.



As diamond compound is only needed in minute quantities, the new dispenser, with its micrometer screw, enables the very smallest quantity to be ejected.

After application of the compound to the work, lapping and finishing can be carried out, by hand or machine, with a number of felt or wood laps, or nylon brushes of various shapes and sizes.

For each grade of compound a box containing a complete set of laps and brushes, with Hyplicator, can be supplied, thus keeping each grade free from contamination by other grades.

It is claimed that lapping a workpiece and polishing it to a mirror finish with diamond compound takes about one fifth of the time required when using other abrasives; the most intricate engraving being handled as satisfactorily as the simplest patterns. When mechanical lapping and polishing is being undertaken, a speed of about 11,000 rev/min is recommended.

In the illustration, the operator is shown lapping a tool used for producing plastic components; the lap, impregnated with compound, is being held in a chuck rotated by a flexible shaft, the motive power being supplied from the motor suspended by his right shoulder.

**Table**

Colours used to define the various grades of Hyprez Diamond Compound

| Micron grade | Compound colour |
|---|---|
| 1/10 | Grey |
| 1/4 | Grey |
| 1 | Blue |
| 5 | Green |
| 6 | Yellow |
| 8 | Red |
| 14 | Brown |
| 25 | Mahogany |
| 40 | Purple |
| 45 | Purple |
| 60 | Orange |
| 90 | White |

# *Success of the Diamond Industry in Israel*

Israel's diamond industry would appear to have had the most rapid growth of any industry in that country in recent years. Taking the 1958 index as 100, production stood at an average 132 last year and at 168 for the first six months of 1960. Employment, at 119 for 1959, reached 138 for the first half of 1960. Compared to this, the average increase in production for all industries stood at 114 last year and 126 for the first half of 1960, while employment for the entire industry went up to 108 in 1959 and to 113 in the first half of this year. Which indicates clearly how far ahead are diamonds.

Exports displayed the same tendency. They were valued at $22,400,000 for the first half of 1959 and at $29 million for the corresponding period of this year. The destination of exports remained practically unchanged: the USA remained by far the best customers; Switzerland, Britain and Belgium accounted for most of the balance. But it is significant that, whereas customers outside these four countries accounted for $5,900,000 worth of exports in the first half of last year, the figure has become $11,700,000 in the first half of 1960.

The expansion rate is even greater than that envisaged by the Ministry of Commerce and Industry's forecast of industrial development. Production, valued at I£66 million in 1958, was expected to increase to I£112 million by 1964/65; employment, from 3,600 in 1958 to 6,500 in 1964/65. However, production figures expected for that time may well be reached already this year; and employment, although it has not yet reached the target, is far ahead of what was expected by now (it already stands at 5,200).

There is no simple explanation to the question as to how the diamond industry, being entirely dependent on exports for its market outlets, could develop so fast in view of this fact. One important factor is the Government's deliberate encouragement to provide additional employment, especially for new immigrants in development areas. The diamond industry, relatively independent of special location requirements, does not need heavy fixed investments. New diamond centres have therefore been set up throughout the country, from Kiryat Shmoneh in the North to Eilat in the South.

Although not offering very high wages initially, as new recruits require training and experience before attaining full earning power, the industry offers, steady, permanent employment, while the work is clean and not physically strenuous. Many new immigrants have therefore gladly taken the opportunity of entering the industry.

Whilst the industry has, by tradition, been centred in Natanya and Tel Aviv, it is expected that other centres will become equally important in time to come. Foremost will be Jerusalem, where a large new diamond centre for 500 workers is being set up in the industrial zone. Other large centres will be situated at Safad in the North and Beersheba in the South.

A further important reason for the expansion has been the branching out of the industry into a wider range of products. Formerly it concentrated on the more expensive type of gemstones which make up only 10% of the total output of the diamond fields. But the smaller, cheaper stones represent a far bigger part of the market and, although more difficult to work, leave a bigger margin between the prices of rough stones and the polished product, possibly as high as 30 or even 40%, as compared to 15 or 20% for the expensive gems.

It was not until in the past two years that a start has been made in Israel in working this type of stone, but it is thought that, by pursuing this direction further, additional work opportunities may be gained from a given value of imported rough diamonds, so that employment may grow even more in years to come although gross output may not continue to rise at the same spectacular rates as in the past.

Gross exports were valued at $34 million in 1938 but of this the added value (the difference between the values of the imported rough and the exported polished stones) was merely $7,200,000, an average of 20%. By 1964 output is expected to total $55 million gross, of which 017 million will be added value—an average of more than 30%. It would appear that the expected gross production will be reached before 1964/65, but the increase in added value will still take some time to develop.

A third factor of importance influencing the industry's development may be found in the field of supplies of raw materials. To regulate imports from primary courses, the Israel Diamond Import Corporation was set up under official auspices in 1959.

Of final importance in the expansion of the diamond industry was the research and development by the Diamond Industry Development and Research Corporation Limited. New mech-

anical working methods, measures to increase output, and improvements in production layout, will all help the industry to expand.

In the past the industry has had its ups and downs, starting in 1940 with 5 plants and 200 workers and expanding rapidly during the war (when traditional sources of polished diamonds were cut off) to reach a peak employment of 4,000 workers when the war ended. But three years later it was down to 800 workers again, after the Belgian industry had been re-established. But instead of succumbing, it climbed back to 2,300 workers by 1955, and has steadily grown ever since.

# *Diamond Tools Safeguard Jobs*

The fight for survival among the smaller engineering firms is won by those who are prepared to experiment and try new, and seemingly unorthodox ideas. To them every new problem is a challenge to their skill and knowledge.

Amongst such firms is the Ajax Jig and Tool Company (Wembley), with factories at Park Royal, London, and Eastcote, Middlesex. The Eastcote factory was opened in June 1956, and for the outset specialized in products that did not conform to ' run of the mill ' work. Besides manufacturing jigs, fixtures, gauges, and press tools, special purpose machines of all kinds are manufactured to customer's order or from designs evolved in the firm's drawing office.

A build-up of skill and experience within the factory has enabled a greater variety of work to be undertaken, and machining of ceramics—Sintox, Castode, alumina and steatite, to name but a few—and hard materials like tungsten carbide, glass, and quartz, has become an everyday occurrence.

Much of the work is small and limits close, and the handling of ceramics, in applications each piece has to be slotted several times with slits no wider than 0.0010 to 0.0012 in., has demanded different methods of clamping. For batch production of components from round stock it has been found that a number of pieces can be held satisfactorily when waxed into a fixture. As slitting is done with diamond impregnated blades, complete rigidity is most essential to avoid the blades running out of alignment. When grinding flat on to a round workpiece satisfactory clamping has been achieved with double-sided adhesive tape.

All ceramic grinding is carried out with diamond impregnated saws and wheels.

As the wearing qualities of tungsten carbide have proved superior to ordinary tool steels the firm manufactures planishing dies in this material, all the initial operations being carried out with diamond grinding wheels, and finishing and polishing with diamond compound.

Most of the grinding machines used have been adapted from standard models and operate, when diamond tools are being used, at three times the normal speed. This produces satisfactory finishes, although speeds of a higher order are usually considered correct.

This firm has found that the extra cost of diamond tools and finishing compounds is largely absorbed by the saving in time achieved in using them; it is true to say that it would be impossible to handle such a variety of work and materials without them.

## *Simple method developed for the recovery of Industrial Diamonds*

A relatively simple and effective system for the reclamation of industrial diamonds from machine wiping cloths has been developed at the US Army's Springfield Armory, Springfield, Massachusetts. Several methods were studied by the Armory from the point of view of efficiency, economy, speed, and precision, and those which were unusually time consuming or which required considerable expense for chemicals and labour were rejected, as were methods which resulted in incomplete reclamation.

The most suitable method developed is to wash the diamond-bearing cloths in one pound lots with a synthetic detergent in a washing machine which is fitted with a wire mesh screen over a false bottom. The recovered residue is then fused in a molten caustic solution of potassium hydroxide (KOH) and sodium nitrite ($NaNO_2$) to oxidize carbon and tungsten, cooled, dissolved in water, and washed free of alkali. The dissolved residue is boiled in concentrated hydrochloric acid (HC1), adding a small amount of concentrated nitric acid ($HNO_3$) to complete the oxidation reaction. After cooling,

washing free of acid, and drying, the residue is subjected to a flotation method of separation in an aqueous solution of thallous formate which has a high but adjustable specific gravity.

The cloths are then divided into one-half pound lots and the procedure is repeated. The separated diamonds are washed, dried, and weighed on an analytical balance and the weight recorded in grammes and carats.

Microscopic examination of the cloths has proved the method 95 to 99 per cent efficient. In addition, the non-destructive nature of the procedure enables the cloths to be reused so that the entire process is circular.

Details of the new method are described in a new report, PB No 161121, entitled 'Reclamation of Diamonds From Machine Wiping Cloths'. Copies of the 11-page report may be purchased for 50 cents each from the Office of Technical Services, US Department of Commerce, Washington 25, D.C.

## *Slate Facing a Skyscraper*

Reputed to be the tallest building in the Commonwealth, the 600 ft. high Canadian Bank of Commerce, in Montreal, Canada, is to be faced on all external elevations—comprising an area of 125,000 sq ft—with Spoutcrag (Langdale Pikes) light sea-green, naturally riven, slate.

I.D.R. readers will be interested in the project because the quarries supplying the slate, The Broughton Moor Green Slate Quarries Ltd, place great store on diamond impregnated saws for cutting the stone.

The material this firm supplies is a very hard, finely grained, massive, slaty rock, naturally green in colour and used as a roofing and facing material as riven.

Vast amounts of rock are first blasted from the quarries, in pieces many tons in weight, and cut into manageable pieces with 42 in. diameter saws, $\frac{3}{16}$ in. wide. After being naturally riven into plates of a nominal 1 in. thickness, 22 in. diameter saws are used to cut the plates to the required size, for this contract, 6 ft. by 4 ft. 6 inches. Each of the plates is then drilled on the edges, and this operation is carried out with tungsten tipped drills.

When the plates arrive in Canada they will be clamped to 5 in. concrete slabs, to give an overall thickness, with slate, of 6 in. nominal.

The actual facing operation, at 3,000 sq. ft. a week, will take 42 weeks to complete.

*An architect's model of the 600 ft. high Canadian Bank of Commerce, Montreal, Canada, to be clad with naturally riven Spoutcrag (Langdale Pikes) light sea-green slate. The architect is Peter Dickinson, A.R.I.B.A., of Toronto, Montreal, Ottawa and London.*

**Discourse on Diamonds** (*Continued from p.* 37)

with it to produce $Co_2$, at the same time exhibiting a spectacular and beautiful display under the surface of the liquid.

Sir Gordon mentioned the many industrial uses of diamond and pointed out how few of the things that normally surround us are not in touch with industrial diamond either directly or at second hand.

He concluded his remarks with observations on the synthesis of diamond, and its relation to other high pressure work.

There was a display of rough and polished diamonds and diamond tools in the Library, visited both before and after the discourse by many of Sir Gordon's audience. These displays were augmented by a collection of photographs and books. Apart from some of the books, which were from the Royal Institution's own collection, these items were lent by De Beers Consolidated Mines Ltd, and the Industrial Diamond Information Bureau.

# *Russians Use Ultrasonics for Diamond Cutting*

*by*

## *A. J. Steiger*

Diamond cutting has been speeded up four to five fold by an ultrasonic method devised at the Mechanical Engineer Institute of the Academy of Sciences USSR, according to *Vestnik Machinostroenie* (Machine-Building Herald), Moscow's leading machine tool journal.

The report indicated that the diamond cutting system developed applies the ultrasonic vibrations to the diamond, not to the cutting instrument, as was previously done in Russian research work aimed at more effective use of ultrasonics in processing hard and brittle materials.

The ultrasonic unit, devised by Russian engineers according to this working principle, has a vibration concentrator to which the diamond is fixed, an abrasive bath of diamond dust, and a revolving stainless steel cutting disk.

This new diamond cutting tool, The Moscow Report said, can cut 1mm depth of diamond in 5 to 7 minutes whereas the usual ultrasonic methods used heretofore, with motionless diamond and vibrated cutting tools, required 25 to 30 minutes. The Russian ultrasonic tool, now being used with success in shop practice, was employed to cut a diamond 3.8 mm wide and 3 mm thick in 30 minutes.

The Russian report gave the following details on the research and development of the ultrasonic diamond cutting tool. The report, written by Prof. P. E. Dyachenko and engineer Yu. N. Mizroki, Russian Academy specialists, said:

"Experiments in ultrasonic diamond cutting showed that while diamonds can be cut by means of ultrasonics, the process was unproductive. With a diamond width of 3 mm cutting was done at the rate of 1 mm in 25 to 30 minutes under the following operating conditions: 45 microns double amplitude of displacement, tool pressure on the diamond 500 grams, and a safety razor blade used as the cutting tool.

An abrasive mixture of diamond dust is the best to use on diamond. Boron carbide powder can also be used but productivity is reduced to one fifth.

In conducting the experiments, cutting tool wear was intolerably high, reaching 2000% of the cut depth in diamond, whereas it was 100 to 200% with other materials (Tungsten carbide, hard alloys). This procedure was difficult to apply because the tool had to be replaced several times in cutting one diamond.

In this connection, the usual system of ultrasonic cutting, in which the processed work-piece is motionless and the tool vibrates, was modified. In the new system the work piece was fixed to the end of the concentrator and vibrated while the tool remained motionless.

To compare the effectiveness of these two systems, various materials were processed by tools of the same material. The experiments showed that if the tool is made of the same material as the work piece, the ratio of cut depth in the work piece to the tool wear will always be considerably larger if the work piece is vibrated. Subsequent experiments showed that in processing divers materials the vibrating element is worn out more rapidly than the fixed. This can be explained evidently by the point that the abrasive particles strike the vibrating element with greater force than the fixed.

Proceeding from this position, a processing system was developed as follows: The work piece (diamond) was fixed to the concentrator and a rotating disk of soft steel 0.1 mm thick and 40 mm in diameter served as the tool. The choice of tool configuration is an important point in cutting diamond. A tool 100 mm long is needed to cut a diamond 5 mm thick. If a narrow steel strip 0.1 to 0.2 mm thick be used as the tool, then the cutter is not rigid enough, Besides, a large amount of abrasive dust and a large bath for abrasive is required.

The use of a cutting tool in the form of a thin revolving disk proved more expedient. In this case the tool is used more rationally, the instrument wear in diameter is slight, the abrasive dust is continuously stirred and supplied to the cutting zone more conveniently. Under such a system of ultrasonic processing, the diamond vibrations are combined with the rapid disk rotation to speed up the cutting process.

The system by which the work piece is fixed to the end of the vibrator cannot always be used for processing the usual workpieces. This system is, however, extremely convenient for cutting diamonds, since a diamond can be readily soldered to a mandrel of small size and fixed to the end of the concentrator. In addition the weight of the diamond is usually very small.

To realize the system described, an experimental unit was constructed. Fixed to the horizontal table is the ultrasonic head with the bath for diamond dust. The head consists of the body (based on a ball bearing and under the

action of a weight moved in a horizontal direction) the horizontally arranged vibrator with a 40 x 40 mm cross section and 120 mm length, and concentrator and mandrel (diameter of 8 mm and 10 mm long) with a diamond soldered to it.

The vibrator was fixed to the body at the nodal point by a clamping device of the knife type. The small bath was tightly fixed to the body by two bolts to the flange arranged at the nodal point of the concentrator. The cutting disk rotated in the vertical spindle. The disk, 40 mm in diameter, was made of stainless steel 0.2 mm thick.

Diamond cutting on this unit showed the system's considerable advantage over that originally used. Thus a diamond 3.8 mm wide and 3 mm thick was cut in 30 minutes; the disk was operated in a 2 mm radius with double amplitude of displacement 35 microns, pressure 500 grams, and 800 disk rev/minutes. With 50 micron double displacement, a diamond of the same width was cut 1.5 mm depth in 10 minutes, the disk operating in a 1.3 mm radius.

Thus, 25 to 30 minutes are required for cutting diamonds by the usual method to a 1 mm depth of cut, but in cutting by the proposed method this time is reduced to 5 to 7 minutes. Diamond cutting at such a rate can be considered acceptable for industrial use.

Using the system described, the Institute of Mechanical Engineering of the Academy of Sciences USSR, together with a factory, developed a diamond cutting tool that is being successfully used under production conditions.

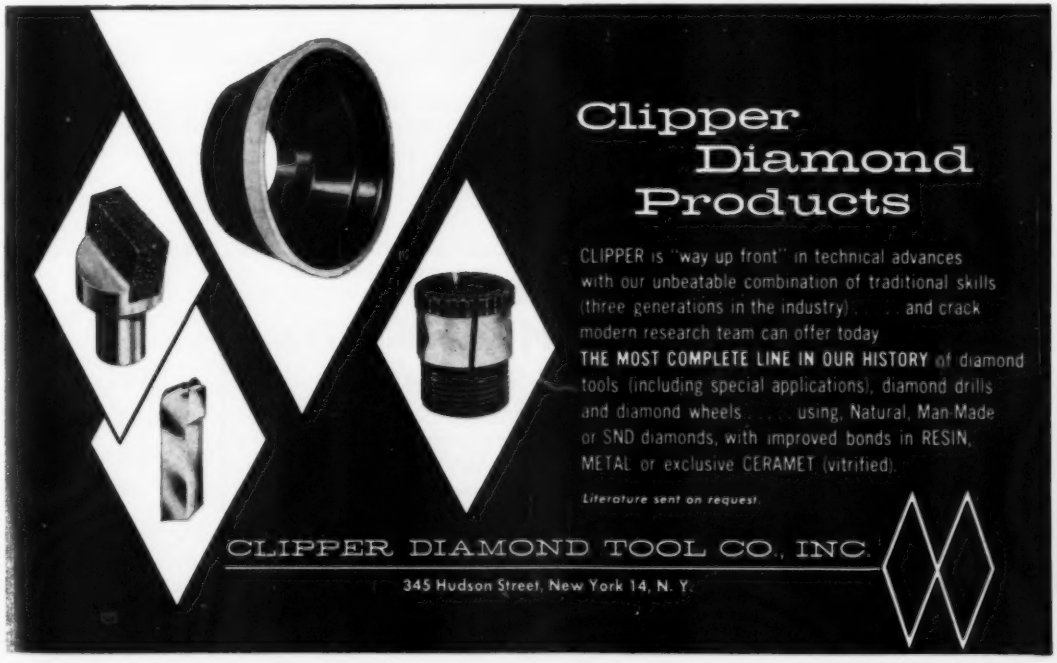
Intensification of the diamond cutting process can proceed in various directions—by increasing the diamond dust concentration in the abrasive mixture or by selecting the best size of abrasive grain.

## *Discourse on Diamonds*

The Director of the National Physical Laboratory, Sir Gordon Sutherland, Ph.D., Sc.D., F.R.S., M.R.I., gave the Friday Evening Discourse at the Royal Institution, on Friday, February 10th on the subject of 'Diamonds'. He started his remarks by pointing out the frequency of discourses on diamonds was increasing (Maskelyne in 1960, Crookes in 1897, Patterson in 1943 and Urie in 1956).

Sir Gordon went on to talk of the physical properties of diamonds, and to relate these properties to the crystal structure, and he made comparisons with other structures containing carbon. He explained the differences between the various types of diamond, and demonstrated the electrical conductivity of type IIb. He also demonstrated the fluorescence of diamonds under ultraviolet excitation, the total reflexion of light, from the back facets of a brilliant cut diamond and the experiment made previously by Sir William Crookes demonstrating that a heated diamond immersed in liquid oxygen will combine

*continued on p. 35*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# *The Precision Machining Of Watch Cases*

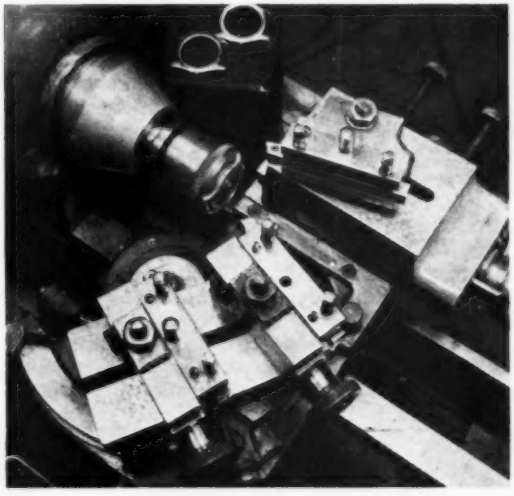
**By a Special Correspondent**

The manufacture of quality watch cases is a highly skilled and precise industry. Among the firms specialising in this field is the Dennison Watch Case Company Ltd, of Birmingham, and in the manufacture of their gold cases many of the operations are carried out with diamond tools.

Diamond turning and milling operations are not new to the watch case industry, but the progress made in design and development of diamond milling machines now permits a wide range of styles and contours to be worked. Special purpose jigs and attachments permit the two sides of a watch case and its lugs to be diamond finished in one continuous sweep; the radiused side, too, can be finished in one pass and the operation continued in a straight line to finish the lugs. Highly satisfactory results are also being obtained with a recently introduced operation for finishing between the two lugs on the outside of the case.

The tools used have a 9° negative rake on the cutting edge with about 1/64 in. land with 1° back relief; these angles are virtually universal for all applications. An acetate solution is used as a cutting lubricant, but any lubricant which evaporates without leaving a stain would be suitable.

In the industry, the use of diamond lapping wheels has been an accepted practice for some time, but Dennisons have found that they can obtain better finishes to flat faces, such as those found on the lugs, by using alloy wheels which they manufacture themselves. Finishing operations, after pressing and milling, require the removal of very little metal, 0.002 to 0.004 in. usually being sufficient. It is only after a diamond has become badly worn that any further polishing is required.



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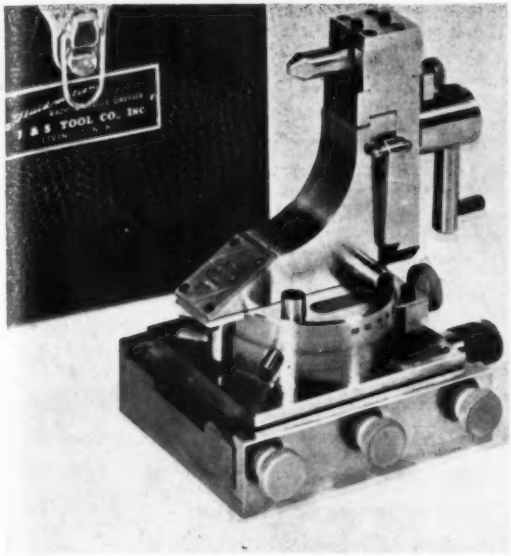


## *Fluidmotion Wheel Dressers*

Fluidmotion wheel dressers are designed by the J. & S. Tool Company, Inc., Livingston, N.J., to dress complex forms simply and accurately. Fluidmotion means that you can dress two angles tangent to a radius in one continuous motion, with 0.0001" accuracy, and with only one setting, the diamond automatically returns to the centre position after dressing the angles. There is no need to pre-set the diamond, or use any other tools except a micrometer and a simple hex wrench. The range of models covers a wide variety of applications on wheels up to 24 in. in diameter.

The illustration is of model "RFG "which has a removable micrometer feed base and is for wheels up to 7 in. in diameter. It is for use on cylindrical, internal, and bench surface grinders and is for precise grinding wheel dressing with a closely controlled diamond infeed to the wheel, independent of table movement, having approximately $\frac{1}{16}$ in. travel.

## SIERRA LEONE SELECTION TRUST'S TRANSPORT SYSTEM

Five Leyland Comet CS 3 vehicles will soon be used by the Sierra Leone Selection Trust Limited to keep its opencast diamond mines running smoothly, in addition to its present fleet of Leyland trucks and tankers. The contract calls for two CS3.R2 models with Edbro-B & E tipping gear and 6 cu yd bodies; two Comet CS3.IR models with Edbro-B & E dropside bodies; and a Comet CS3.IR model with a Darham 1,500-gallon fuel oil tank.

The whole project is dependent on fuel oil, and a fleet of Comet tankers provides a mobile pipeline between the mines at Yengema and the nearest railhead at Segbwema, 65 miles away. Fitted with Darham 960-gallon tanks, the fleet averages some 2,700 miles a month.

The haulage trucks also carry workers to the opencast sites, and washed and sized gravel from the pan plants to the Concentrate House at headquarters, where the diamonds are sorted from the gravel. A security guard travels with each load of concentrate.

Yengema has its own airstrip from where the diamonds are flown to Freetown.

As well as conveying heavy equipment from the Yegbwema railhead to headquarters, and often bringing goods on the 350-mile journey direct from the docks at Freetown, the Comets also carry heavy machinery and equipment such as steel pipes between Yengema and the other mining area at Tongo, 120 miles away.

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# INDUSTRIAL DIAMOND ABSTRACTS

Industrial Diamond Information Bureau.
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Telephone : FLEet Street 1577

1961 Volume 18
FEBRUARY

## DIAMOND MINING AND INDUSTRY

**Diamonds of Guinea**

N. Gavrilov, V. Konstantinov. *Ogonek* 1960 Vol 38 (17) pp 17-18 (Apr) ; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1948 (Sep) (Original in Russian)
*E* *Eb.3671*

**Kimberley's 89 years dates from start of Big Hole**

C. B. Harris. *Diamond News* 1960 Vol 23 (11) pp 19, 21 (Aug)

Recalls the circumstances which led to the discovery of the Kimberley Open Mine. 1 illustr.
*D* *Eb.28.3612*

**Diamond Corporation to help**

Anon. *Diamond News* 1960 Vol 23 (11) p 17 (Aug)

Sierra Leone Ministry of Mines and Labour has announced that the Diamond Corporation of Sierra Leone will help the Government's mining and geological departments in prospecting work in various parts of the country. The agreement covers prospecting for gold and platinum, under which the corporation bears all expenses and has mining rights on economically workable deposits and prospecting for diamonds outside Sierra Leone Selectrion Trust leased areas.
*X* *Eb.12.3672*

**Are there diamonds in Madagascar ?**

Anon. *Diamond News* 1960 Vol 23 (11) pp 15, 16 (Aug)

It is suggested that if the gem industry of the new republic is to prosper, a vigorous search for diamond deposits and other precious stones should be undertaken. Even if gem diamonds were not abundant, the demand for industrial stones would make the search rewarding. *D* *Eb.12.3625*

**Do diamonds exist on Moon ?**

Anon. *Diamond News* 1960 Vol 24 (1) p 11 (Oct)

The discovery of the hitherto unknown rock, coesite, has suggested to scientists that it is probable that diamonds exist on the moon. Quartz, when subjected to the same temperatures and pressures required to produce synthetic diamonds, gives coesite. Coesite was produced by the large meteorite which crashed into the Arizona Desert ; many such meteorites fall on the moon, thus creating conditions suitable for making diamonds. *D* *F.12.39*

**Rare variety of diamonds in Indian Mine**

Anon. *Diamond News* 1960 Vol 24 (1) p 11 (Oct)

A rare variety of diamonds has been found in a rock formation in the Majhagawan Diamond Mines in the Panna District, according to an official announcement.
*D* *F Hd.371*

**Diamond racket remains dangerous**

Anon. *Diamond News* 1960 Vol 24 (2) pp 3-4 (Nov)

Asseses the situation in 1960 regarding illicit diamond buying. *D* *F.251.2598*

**Patents granted to G.E.C.**

Anon. *Diamond News* 1960 Vol 23 (11) p 18 (Aug)

The General Electric Co of America has been granted patents on the process and apparatus for making synthetic diamonds. The company has announced that the patents, issued by the US Patent Office, cover the 'basic' high-pressure equipment used as well as later improvements on such equipment.
*D* *Fh Ha W.545*

**Failure of new alluvial diggings**

Anon. *Diamond News* 1960 Vol 23 (11) p 23 (Aug)

The two-months-old alluvial diamond diggings at Longlands on the Vaal River near Barkly West, sponsored by the Government, has not proved to be the success hoped for and diggers are now looking for new payable ground. *D* *Ebc.12.361*

**De Beers gift of diamond exhibit to Kimberley Museum**

Anon. *Diamond News* 1960 Vol 23 (11) pp 7, 9 (Aug)

An exhibit given by De Beers Co illustrates the growth of diamond mining in Kimberley by showing the historical development of the Wesselton, Bultfontein, and Dutoitspan mines. 1 illustr.
*D* *Eb Hd.28.3612*

**Revival of interest at Lichtenburg**

Anon. *Diamond News* 1960 Vol 23-24 (11) p 23 (Aug)
*D* *Eb.12.361*

**USSR produces synthetic diamonds**

Anon. *Diamond News* 1960 Vol 23 (11) p 27 (Aug)

According to a claim made by the USSR Academy of Sciences, reported in the *Wall Street Journal*, Russian scientists have discovered how to synthesize diamond and are now researching into a way to obtain crystals on a commerical scale. *D* *Fh Ha.33*

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**Israel to buy diamonds direct from States in West Africa**
Anon. *Diamond News* 1960 Vol 24 (1) p 19 (Oct)
*D* *F.251*

**Important deposits in Guinea**
Anon. *Diamond News* 1960 Vol 24 (2) p 23 (Nov)
Mechanical excavators have been introduced in the working of Guinea's important diamond deposits. The discovery and nature of the deposits are briefly described. *D* *Ebe.3671*

**£1,050 stone found at Longlands**
Anon. *Diamond News* 1960 Vol 24 (2) p 28 (Nov)
See also *Industr Diam Abstr* 1960 Vol 17 p A269 (Nov). *D* *F.12.3612*

**Mining miscellany**
Anon. *Min J* 1960 Vol 255 (6535) p 568 (Nov 18)
A small new diamond field was discovered recently in South Kalimantan near Bandjarmasin's Ulin airport, Indonesia. One diamond found weighed 12 carats.
*D* *Eb.12.3751*

**Mining's mixed fortunes in 1960**
Anon. *Min J* 1960 Vol 255 (6540) pp 705-708 (Dec 23)
Includes a brief assessment of the diamond industry.
*D* *F.25*

**Tanganyika's proposal for diamond prospecting**
Anon. *Min J* 1960 Vol 255 (6540) p 715 (Dec 23)
The Tanganyika Government proposed to end, from Jan 1, 1961, the diamond prospecting monopoly held by Williamson Diamonds, and to divide the territory into 24 blocks, each of 15,000 sq. miles, open to the applications of established mining companies.
*D* *F.12.364*

**Method of prospecting for original deposits of diamonds**
A. I. Shalimov. *Inform biul NIIGA* 1959 (14) pp 33-40; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (7) p 2340 (Oct) (Original in Russian)
*D* *Ebe.12.1456*

**The use of aeronautical methods in prospecting primary diamond deposits**
Anon. *Sowjet Buchneuerscheinungen, Vorankuendigungsdienst* 1960 (33) p 13 (Original in Russian)
Book, Isd-wo AN SSSR. 1960, 160 pp. Price DM 4.--
The work contains the most important results in the development of a technique for the complex application of aerial and aero-magnetic photography in prospecting diamond deposits in West Yakutia. The following questions are discussed: (*i*) the complex use of aero-geophysical and aerial photographic work; (*ii*) the assessment of local aero-magnetic anomalies; and (*iii*) connections between kimberlite particles and tectonics. In a general scheme, all methods used in the prospecting of kimberlite pipes and all procedures for identifying the parameters of stimulation on the basis of magnetic data are described. Results in the calculation of deposit depth of some traprock veins, the apparent deposit depths of the kimberlite pipes and their magnetic properties are mentioned, and the possible errors in identification of the magnetic mass distributed on the pole surface of the body, dependent on the feed-faults of the photograph and sluggishness in the registration of anomalies, are noted. A simplified, graphic method of analysis for treating aerial photographs with the aid of so-called 'geographical tables' (special networks) is presented. The book is intended for geophysicists, geologists, and geographers.
[Not in library of Industrial Diamond Information Bureau]. *A* *Ebb.12.1456.332.52*

**Diamondiferous jottings [:] More man-made diamonds**
Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (8) p 3 (Oct)
It is reported that Russian pilot plant production of from 100,000 to 250,000 ct of synthetic diamonds/year was due to begin towards the end of 1960.
*D* *Fh Qc.33*

**General Services to purchase industrial diamond dies**
Anon. *Mach Tool Blue Bk* 1960 Vol 55 (12) p 176 (Dec)
The US General Services Administration announced that it seeks to purchase 3,758 industrial diamond dies for the national stockpile of strategic and critical materials. Both foreign and domestic sources will be considered. *D* *Nk.141.342*

**Preview—Seventh Commonwealth Congress (Pt 11)**
C. Mamen. *Canad Min J* 1960 Vol 81 (8) pp 58-66 (Aug)
This part of the preview of the Mining and Metallurgical Congress, to be convened next year by the South African Institute of Mining and Metallurgy, describes most of the mines to be visited and includes a description of diamond mining in Kimberley. An outline of the history of the Kimberley mines is given, and the mining processes are described. The recovery of diamonds from the blue ground on grease tables is covered. 6 illustr.
*L* *Eb Hd.3612/Ebd F Hg*

**Miscellaneous information, Congo [:] Diamond**
Anon. *Miner Tr Notes* 1960 Vol 51 (6) p 71 (Dec)
Briefly describes the situation regarding diamond mining in the Congo in Oct, 1960.
*D* *F Hd.365*

**Diamond [:] Israel**
Anon. *Miner Tr Notes* 1960 Vol 51 (5) pp 18-21 (Nov)
The report describes the diamond industry in Israel, covering origin, current status, kinds of stones produced, the Diamond Exchange, the Diamond Control Board, and source of control. 3 tables.
*D* *F.25.351*

**How new methods and new equipment increase diamond recovery in Africa, Pt III of III**
A. F. Daily. *World Min* 1960 Vol 13 (12) pp 32-37, 72 (Nov)
A detailed report of how diamonds are separated and recovered from Kimberlite and alluvial gangue. The Diamond Research Lab has developed improved methods and equipment, particularly conditioning of wettable diamonds, the grease belt, the high tension separator, and it is expected, the optical separator. Basic research is being done on heavy media separation. 3 illustr, 1 table.
*D* *Ebb F Hg.1456/Ebe F Hg.1456*

**The new Russian diamond area**
Anon. *Financial Times* 1960 (22271) p 5 (Dec 21)
A new find in the Siberian tayga is said to be 'incomparably richer' than the Mir diamond field, at present the richest kimberlite pipe in the region.
*D* *Eb.12.33*

**Diamond mining in the Kasai [:] Operations may be resumed**
Anon. *Financial Times* 1960 (22,266) p 5 (Dec 15)
The possibility of resuming diamond mining operations in the Kasai province of the Congo has been discussed in talks between the Kasai provincial president, the management of Forminière, and officers of the UN Ghana brigade. The brigade is confident that it can control any further disturbances in the area.
*D* *Eb Hd.365*

## PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF DIAMOND

**Industrial diamonds . . . Man-made or natural ? [:] Man-made diamonds show marked superiority over natural diamonds**

N. H. Leventhal (General Electric Co). *Amer Mach* 1960 Vol 104 (19) pp 102, 104-105 (Sep 19)

The author claims that synthetic diamonds have shown superiority over natural diamonds in laboratory surface grinding evaluations. Test procedure is described and tables compare grinding ratios, wheel wear/cub. in. of carbide removed, and carbide removal rates. Comparisons are made between GE type RVG and normal natural and natural SND treated diamond grits, and between GE type RVG diamond and natural diamond when grinding Carboloy Grade 270. The conclusion drawn is that friability and particle shape of the synthetic material make it superior to natural diamond grit. 5 tables.

*D* *F*Fh/Nv*Nvh*

**Industrial diamonds . . . . Man-made or natural ? [:] Conventional natural diamond grit has never been successfully challenged**

J. H. Olson (Englehard Hanovia Inc). *Amer Mach* 1960 Vol 104 (19) pp 103, 105 (Sep 19)

Natural diamond is said to be more efficient than ever before due to research correlating the effects of particle shape with abrasive action, and because of advances in crushing and sorting on a production basis. This article seeks to analyse the new developments in natural diamonds in their effects on increased grinding efficiency and longer life of abrasive tools. Research continues at Engelhard Hanovia's Diamond Technology Laboratory where two new grits have been developed : SND-RB (needle) grit, available treated and untreated, and SND-MB (blocky), available in standard and premium grades. The applications and advantages of these new materials are outlined and the significance of the term ' shape count ' is explained. The latter is in essence a description of the average diamond particle shape of a grit and the accuracy of the method developed to control shape count, known as Selected Natural Diamond, is relatively high. Greater efficiency and longer tool life achieved by SND-RB grit is explained by greater friability of this material. 1 illustr. *D* *Kl.131*

**The future development of crystallography in the light of the resolutions of the 21st Congress of the Communist Party of the Soviet Union**

A. V. Shubnikov. *Sov Phys, Crystallogr* 1960 Vol 5 (1) pp 1-9 (July-Aug) (Original in Russian)

Considers the questions with which crystallography should be concerned during the next few years. Among these is the production of crystals having properties necessary for technology, *eg* diamond and borazon. The agenda includes development of apparatus for growing diamond and other crystals of practical importances. The author stresses the difficulty of convincing non-specialists in crystal physics that the industrial growing of crystals is the most complex question of the new technology, and refers to foreign reports of the conditions needed to produce synthetic diamonds.

*D* *Fh Ha W.231.33/Vh.231.33*

**REQUESTS FROM AMERICA**

**American readers who wish to order a photostat or reprint of an article abstracted in Industrial Diamond Abstracts are advised to apply directly to the appropriate journal if this is an American publication.**

**The binding energy of the σ bond, II. Application to the diamond crystal**

Kiyosi O-Ohata. *J phys Soc Japan* 1960 Vol 15 (7) pp 1258-1263 (July) *Insdoc List* 1960 Vol 7 (20) col 1623 (Oct 16)

A calculation of the cohesive energy of the diamond crystal has been carried out by using the general scheme which is derived by the Heitler-London approximation in the preceding article of this series. It has been found that the value of the binding energy is about 3.26 eV per a bond in a rather good agreement with the observed one. 1 illustr, 4 tables, 10 ref.

*X* *F Ub*

**The jewel case**

Arthur D. Little Inc. *Industr Bull* 1960 (376) pp 1-2 (June) ; *Battelle Tech Rev—Abstr* 1960 Vol 9 (12) p 707a (Dec) No 13054

A brief account of synthetic diamond developments from late 1890's to the present.

*D* *Fh Ha.132*

**Science supplement : Man-made diamonds**

A. K. Parker. *Beetle Bull* 1960 (12) p 31

A brief outline is given of the various efforts made to synthesize diamond. 2 illustr.

*D* *Fh Ha*

**Some facts on diamonds found in form of polycrystalline aggregates**

J. M. Kravtzov, S. I. Futerhendler. *Zap Vses miner Obtsht* 1960 pp 464-466 ; *Insdoc List* 1960 Vol 7 (19) col 1595 (Oct 1) (Original in Russian)

*D* *F Ub*

**Elastic behaviour of diamond**

R. S. Krishnan, V. Chandrasekharan, E. S. Raja-Gopal. *Proc nat Inst Sci India Pt A* 1960 Vol 26 pp 311-319 ; *Bibliogr Sci Publ S & SE Asia* 1960 Vol 6 (10) col 266 (Oct)

*D* *F Unc*

**Materials—old and new**

J. White (Sheffield Univ). *New Scientist* 1960 Vol 8 (210) pp 1384-1386 (Nov 24)

Discusses new materials now under research which are expected to have important practical applications in the years ahead. The production of synthetic diamond is regarded as perhaps the most dramatic outcome, so far, of investigations into the effects of high temperatures and pressures on the chemical stability of materials which have made it possible to synthesize new materials and minerals previously produced only deep in the earth's crust. 3 illustr.

*D* *B Ct.131/Fh Ha*

## PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF HARD MATERIALS

**Ionic models**

J. E. S. Whitney ; Catalin Ltd, Waltham Abbey, Essex. *New Scientist* 1960 Vol 8 (208) p 1254 (Nov 10)

Diverse ionic models can be built using a novel system to serve as visual aids in demonstrating such aspects of crystal structure as defects and their significance in semi-conductivity, etching, and crystal growth, et cetera. The principles of the system are explained. The models are marketed in the form of basic and standard sets and as separate components.

*D* *Bd Ubb Vfd W*

**Physics of semi-conductors**

R. A. Smith. *Nature, Lond* 1960 Vol 188 (4751) pp 632-633 (Nov 19)

Summarizes papers given at a recent international conference on the physics of semi-conductors, sponsored by the International Union of Pure and Allied Physics and arranged by the Czechoslovak Academy of Sciences. *D* *Bde Uc*

**Distortion of lattice structure of metals by grinding**

Yu. S. Terminasov, A. G. Yakhontov. *Metal Iovedenie i Term Obrabotka Metallov* 1959 (5) pp 19-23; Henry Brutcher Transl (4579) 5 pp. Price 16s

Describes studies of the distortion of carbon steel structure caused by grinding under different conditions. Structural distortions were estimated from the changes in width in intensity of diffraction lines. The strain hardening of the metal surface after grinding was determined by micro-hardness measurements. From a study of the surface of ground metals, it was established that production grinding is a hardening operation since the micro-hardness increases 30-70%, depending on grinding conditions. Other conclusions are recorded. 7 illustr, 6 ref.
*D* *Bfdz Chc Ubb/Bfdz Chc Unhd*

**High alloy stainless steels and alloys.** Aciers et alliages inoxydables fortément alliés

J. Bourrat. *Métallurg et Constr Mécan* 1960 Vol 92 (11) pp 867-878 (Nov) (In French)

Covers properties of 18/10 molybdenum steels, austeno ferritic stainless steels, and high alloy nickel alloys. 10 illustr.
*K* *Bfdb Un/Bfx Un*

**Investigation of the effect of certain factors on formation of dislocations during crystallization and on the dislocation states in germanium monocrystals**

A. D. Belyaev, V. N. Vasilevskaya, E. G. Miselyuk. *Sov Phys Solid State* 1960 Vol 2 (2) pp 208-214 (Aug) (Original in Russian)

4 illustr, 15 ref, 1 table. *D* *Bfr Unk*

**Electron microscope out-of-focus image of the edge of a crystal lattice**

H. Hashimoto, H. Watanabe. *Nature, Lond* 1960 Vol 188 (4750) pp 571-572 (Nov 12)

3 illustr, 2 ref. *D* *Ubb Vw Wcmm*

**Lattice defects and mechanical properties of solids**

B. A. Bilby. *Nature, Lond* 1960 Vol 188 (475) pp 713-715 (Nov 26)

Summarizes papers given at the second symposium of the Fifth Congress of the International Union of Crystallography, held in Aug, 1960, at Cambridge.
*D* *Bz Ubb/Bz Un*

**Leaded steels**

L. Sanderson. *Tooling* 1960 Vol 14 (11) pp 33-35 (Nov)

Various devices are adopted by the metallurgist to give greater machinability to steels, particularly where the stresses imposed in service are not likely to be high. The subject is surveyed here.
*D* *Bfdz Unp*

**Yttrium, scandium and the rare earths.** Yttrium, Scandium und die seltenen Erden

K. Strnat, H. Weik. *Metall* 1960 Vol 14 (12) pp 1163-1170 (Dec) (In German)

Discusses the chemical and mechanical properties of these materials and briefly considers technological problems arising from them. 15 illustr, 7 tables, 69 ref.
*K* *Bfu U*

**Distortion in tool steels**

B. S. Lement. *Bull Brit Non-ferr Met Ass* 1960 Vol 40 (376) p 568 (Nov)

Book, American Society for Metals, Metals Par, Novelty, Ohio. 1959, 173 pp. Price $10.
[Not in library of Industrial Diamond Information Bureau]. *D* *A Bfd Unk.52*

**Making new materials at very high pressures**

H. A. Gebbie (National Physical Lab). *New Scientist* 1960 Vol 8 (214) pp 1660-1662 (Dec 22)

Diamond is by far the most important material synthesized by using very high pressure techniques, but this article draws attention to other possibilities of creating a wide range of substances, including semi-conductors, and harder steels. 1 illustr.
*D* *Bde Ct Vcb/Bfd Ct Vcb/Fh Ha Vcb*

**Properties of graphite. Pt III—Crystal compounds and irradiated graphite**

L. C. F. Blackman. *Research, Lond* 1960 Vol 13 (12) pp 492-502 (Dec)

Most chemical reactions of graphite involve entry of atoms or molecules into the interlayer spaces between the hexagonal networks. This article describes the somewhat analogous structures which are produced when graphite is irradiated with high energy particles. 8 illustr, 3 tables, 11 ref. *D* *Skf Ub*

**Identifying precious stones (XXII).** Wir bestimmen Edelsteine (XXII)

Anon. *Gold u Silber* 1960 Vol 13 (11) pp 39-40 (Nov) (In German)

Gives further hints useful in identification and begins an alphabetic list of precious materials, listing peculiarities. *K* *Bb Ccb*

**The theory of the temperature dependence of the dispersion and excition absorption of light in crystals**

S. I. Pekar, V. L. Strizhevskii. *Sov Phys, Solid State* 1960 Vol 2 (5) pp 816-819 (Nov) (Original in Russian)

8 ref. *D* *Ub*

**Condensed review of some recently developed materials**

Anon. *Machinery, NY* 1960 Vol 67 (2) pp 127-135 (Oct)

Materials are arranged alphabetically by trade names with a brief description of properties and applications.
*D* *B.572*

**Pyroceram**

C. H. Greene. *New Scientist* 1960 Vol 8 (214) pp 1708-1710 (Dec 29)

Describes the chemistry and production of a new class of material, the glass-ceramics, which can be shaped by the processes used for ordinary glass but which have new and unique properties. The materials, developed by the Corning Glass Works and called Pycoceram, are manufactured by the controlled crystallization of a wide variety of glass compositions. The possibility of high precision finishing by grinding has meant that the material can be used as nose cones for high speed missiles.
See also *Industr Diam Abstr* 1960 Vol 17 p A93 (Apr). *D* *Blz Cvd Nd Wghc*

**On the influence of small additions of nonmetals and metals on the sintering, working and the mechanical properties of tungsten**

H. Braun, K. Sedlatschek. *J of the Less-Common Metals* 1960 Vol 2 (2/4) pp 277-291 (Apr-Aug); *Battelle Tech Rev—Abstr* 1960 Vol 9 (12) p 742a (Dec) No 13703
*D* *Bfp Ceq/Sbz U*

## DIAMOND, ETC, IN INSTRUMENTS

**The ultra-thin section method in electron microscopy**

G. Bartsch. *Jena Rev* 1960 Vol 5 (5) pp 163-166 (In English)

New cutting instruments and appropriate preparation methods had to be developed in order to utilize fully the possibilities of the electron microscope in studying the internal structure of biological objects. Since it is essential to keep the layers very thin, conventional microtomes are unsatisfactory. Various attempts to refine microtomes are mentioned. The most important pre-requisites for producing thin enough specimens are summarized as: a fine feeding system; a precise return of the specimen into its original position after cutting and a free movement past the knife; and the choice of a suitable knife and embedding medium for the specimen. Fernández-Morán was the first to use crystalline diamond knives, which when treated carefully can be used for six months and more, even permitting preparation of ultra-thin sections of metals. 10 illustr, 25 ref. *D* *Bz Ceg Nfn*

**Inspection in pictures**

Anon. *Mach Tool Rev* 1960 Vol 48 (287) pp 131-134 (Sep-Oct)

Various measuring and inspection devices are photographed and illustrated. 12 illustr.
*D* *Qd W/Wb*

**Problems in connection with the measurement of variable cutting-edge forces of tools**

E. Bickel. *Microtecnic* 1960 Vol 14 (5) pp 226-232 (Oct) (In English)

Describes the development and capabilities of a very rigid dynamometer for measuring cutting forces varying in magnitude and frequency. The instrument is said to enable simultaneous measurement or oscillographic record of three components of the cutting force. 6 illustr.
*D* *Pd Uqg Vfd Wgd*

**Oxide masking**

K. E. Daburlos, H. J. Patterson. *Bell Lab Rec* 1960 Vol 38 (11) pp 417-420 (Nov)

The silicon is separated into individual elements by scribing with a diamond point and then breaking along the scribe made. Before scribing, however, the collector junctions of all the transistors are etched in to prevent the junction impairing its rectification characteristics. 3 illustr.
*E* *Bhc Cp Nc*

**Air gages for checking waveguide dimensions**

L. E. Abbott, A. F. Pomeroy. *Bell Lab Rec* 1960 Vol 38 (11) pp 421-423 (Nov)

Surveys previous methods of measuring the inner diameter of a tube and points out the superiority of the air gauge method. The method is described and it is claimed that accuracies of 0.00004 in. are easily obtainable. 3 illustr. *E* *Tz Vfd Wb*

**Level tester**

Taylor, Taylor & Hobson Div, Rank Precision Industries Ltd, 37-41 Mortimer St, London W 1. *Mach Lloyd* 1960 Vol 32 (24A) p 41 (Nov 26)

The Talyvel instrument can be used to check either horizontal or vertical surfaces and is said to register changes in level of less than one second of arc. 1 illustr. *D* *Unfz:Qd Wbz*

**Hauser double-image microscope**

Henri Hauser SA, Bienne, Switzerland; British Rep: Wickman Ltd, Coventry. *Machinery, Lond* 1960 Vol 97 (2506) p 1201 (Nov 23)

The microscope can be used to check optically holes up to 0.2 in. diameter, and it is stated that centre lines of hole and the optical system can be aligned to 0.00004 inches. The instrument can also be used as an edge finder. 1 illustr. *E* *Wcmz*

**New Mike standard end measure introduces lapped flat end**

J. T. Slocomb Co, South Glastonbury, Conn. *Grinding & Finishing* 1960 Vol 6 (11) p 72 (Nov)

In a new Slocomb line of standard end measures for testing micrometers one end is lapped flat and square while the other end is spherical. The advantage of the flat end is said to be that it gives a positive locating face and assures that the end measure is properly aligned to the micrometer measuring terminals. 1 illustr. *D* *Az Chd Vfd Wmt*

**Machining time measured**

Ericsson AB, Stockholm. *New Scientist* 1960 Vol 8 (214) p 1652 (Dec 22)

A critical and objective examination of many of the factors associated with the machining of metals may be made possible by an apparatus described here. By measuring the thermo-potential generated at the tool tip, accurate measurement of the time during which a workpiece is actually being subjected to the action of the machine, tool should result. 1 illustr.
*D* *Bf Ceq Wb*

**A new kind of electron emission microscope for examining surface structure in chemistry and metallurgy.** Neuartiges Elektronenemissions-Mikroskop zur Strukturforschung in der Chemie und Metallurgie

Anon. *Industr Anzeig* 1960 Vol 82 (97) pp 1665-1666 (Dec 2) (In German)

This new instrument, recently shown by a Swiss firm at a metallurgical conference, is intended for examining metal testpieces 15 mm in diameter and 0.5-3.5 mm thick. It has an enlargement of 500 to 1,500 × and with the aid of a further microscope, which can be swung into place, this can be increased to from 15,000 to 30,000 times. 1 illustr.
*K* *Bf Ubm Vw Wemm*

**Air gage lends extra accuracy to drilling**

Mechanical Products Corp of Chicago. *Mach Tool Blue Bk* 1960 Vol 55 (12) p 158 (Dec)

An Ames AG5 Accu-Flow air flow gauge, said to be adaptable to any tolerance to millionths of an inch, is set to the precise measurement needed on a critical drilling operation. A needle indicates exactly when proper hole depth is reached. The gauge can be used for a variety of continuous non-contact measuring or comparing applications and as a grinding, hole, or depth gauge. 1 illustr. *D* *Cfb Wbb*

**Checking the form of cylindrical components**

Hommelwerke GmbH; British Rep: Rubert & Co Ltd, Cheadle, Ches.

A special feature of the instrument is that it measures not only the roundness circumferentially, but, with the same stylus, also measures straightness and parallelism vertically and thus provides a full three-dimensional description of error of form. A novel automatic centring device is said to be virtually infallible and much quicker than conventional devices. The four parts of the equipment are described. Bores down to 0.120 in. diameter can be measured. 1 illustr.
*D* *Agz Qd Wbz*

**The Ultrotome ultramicrotome — basic principles and summarized description of construction**

B. Hellstroem. *Science Tools* 1960 Vol 7 (2) pp 10-16 (Aug)

The basic principles of ultramicrotomes and the reasons for choosing those employed in the Ultrotome are discussed. The latter are summarized: (*i*) thermal feed is used for producing ultra-thin specimens; (*ii*) cutting strokes are automatic. An electro-dynamic 'motor' is driven by an electronic control unit; (*iii*) gravity is used as the cutting force; and (*iv*) the return stroke is obtained by elastic deformation of the foundation by means of an electro-magnetically applied force synchronized with the motor action. Cutting force and specimen motion, optics, lighting, and electrical equipment, and installation and accessories are described. Problems connected with the knife are not covered, but may be dealt with in a future article. 7 illustr. *D* *Pdm*

**Feeding by increments**

J. S. Spizig. *Mach Tool Blue Bk* 1960 Vol 55 (11) pp 170-171 (Nov)

Moving a slide only a few ten-thousands of an inch is often very difficult, particularly with grinders or precision machines, but the patented device described enables a slide to be moved in very small increments. 1 illustr. *D* *Ceqz Pr Pscz*

**Use of α-rays from radioactive isotopes in instruments for controlling the dimensions of parts in grinding**

V. V. Kondashevskii *et al.* *Atom energ* 1960 Vol 8 (6) pp 576-578 (June); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (6) p 1948 (Sep) (Original in Russian)

*E* *Chc Pr Syb Wp*

**Radioisotopes in the control of machine tools**

Anon. *New Scientist* 1960 Vol 8 (210) p 1394 (Nov 24)

Digest of paper by J. H. Tolan (Lockheed Aircraft Corp) to the American Society of Automotive Engineers.

Describes investigations into a monitoring device, based on a radio-isotopic back-scatter technique, which senses changes in contour or position and thus enables commands to be given to a machine tool to produce workpieces of the specified form and size. The technical feasibility of the device is said to be certain and the next phase of research will consider scientific applications and development of units for trials on machine tools. *D* *Pr Syb Wp*

**30,000 magnification**

Associated Electrical Industries Ltd. *S Afr Min Engng J* 1960 Vol 71 Pt 2 (3533) p 1029 (Oct 21)

The type EM6 Electron Microscope is being used at Durham University mainly for two research projects involving the study of electro crystallization of metals, oxides, and salts and of the ultra-fine structure of carbons. 1 illustr. *D* *Wcmm*

**Non-destructive testing. Ultrasonic methods. Pts 1 & 2**

W. E. Schall. *Instrum Pract* 1960 Vol 14 (10) pp 1078-1087 (Oct), (11) pp 1181-1188 (Nov)

39 illustr. *D* *Cy Vwghb*

**LITERATURE REQUESTS**

**When applying for the loan of literature abstracted in this journal, please quote the title of the article, the name of the author, and the number of the page on which it appeared.**

**S. P. S. internal and external comparator**

Shaftesbury Precision Service Ltd, Sutherland Ave, Street Lane, Leeds 8. *Mach Shop Mag* 1960 Vol 21 (12) p 776 (Dec)

A hand-held gauge or comparator is of particular use when machining one component to fit another in that it permits a dimension measured on one component to be transferred easily to the other. The standard instrument has a capacity of ¼ to 4 in. and the dial gauge reads in increments of 0.0005 inch. Other instruments can be supplied to order. 2 illustr.

*D* *Az Ceq Qd Wbz*

**Talysurf attachment checks ball surfaces**

Taylor, Taylor & Hobson. *Metalworking Prod* 1960 Vol 104 (51) p 13 (Dec 21)

The prototype of a new development that enables the surface finish of a 1 mm diameter ball to be measured and recorded accurately, in half millionths of an inch, is built as an attachment for use with the Talysurf Model 3 surface measuring instrument. The range of balls catered for is 1 mm to 1 inch. 1 illustr.

*D* *Wgf*

**A new technique for rapidly inspecting awkward components**

J. E. Baty & Co Ltd, Burgess Hill, Sussex. *Mach Shop Mag* 1960 Vol 21 (12) pp 726-732 (Dec)

The Optotrace measuring instrument is described. An important aspect of the system is the accurate marking of the master trace on the glass plate so that thickness of the scratched line is kept to a minimum and the edges are undistorted. The scribing arm has a finely adjustable balancing arrangement so that pressure of the diamond scribing point can be accurately controlled and a line only 0.001 in. thick produced. A small blow unit prevents build-up of swarf round the diamond point, which is secured in a transparent plastic holder so that when a trace has been made it can be checked on the screen with the arm still in position between the light source and the lens system. A feature of the scribing arm unit is the co-ordinate positioning device which makes it possible to traverse the diamond up to ½ in. in either direction by rotating two micrometer dials graduated in 0.0001 in.; the various advantages of this device are explained. 7 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A212 (Sep). *D* *Ncz Wc*

**When the tool breaks . . . photoelectric probes stop the machine**

A. D. Gunderson (George Gorton Machine Co). *Amer Mach* 1960 Vol 104 (19) p 140 (Sep 19)

It is claimed that rotating cutting tools or tool shanks as small as 0.080 in. diameter can be monitored for breakage with photo cells and light sources used in Gorton transfer machines to stop the line and signal the operator when tools break. The photoelectric cells, sealed in glass envelopes against cutting fluids, *etc*, have been found more reliable and compact than mechanical probes. 2 illustr.

*D* *Pd Unt Wp*

**The production and performance of metrological diffraction gratings**

V. W. Stanley, R. G. N. Hall. *The Prod Engr* 1961 Vol 40 (1) pp 38-44 (Jan)

To cut a helix of 2,500 threads/in., the impressing tool, a diamond lapped to a 90° Vee, is attached with the scanning head to a plate mounted on the tool slide. A method for checking lathe performance by means of the moiré fringe system is described. 8 illustr, 16 ref.

*E* *Ceqb Nf Pr Tfdb*

**Report of the activities of the Max Planck Society for the Furthering of the Sciences (eV) for the period 1.4.1959 to 31.3.1960.** Tätigkeitsbericht der Max Planck-Gesellschaft zur Förderung der Wissenschaften e.V. für die Zeit vom 1.4.1958 bis 31.3.1960

Anon. *Die Naturwissenschaften* 1960 Vol 47 (24) pp 553-582 (Dec) (In German)

In the electron microscopy section, tests were carried out by K. Mueller and others on a newly developed electron microscope magnifying 10,000 times; a new kind of reflection electron microscope was developed.

*K* *Wcmm*

**Electron microscopy at Eastman Kodak**

C. F. Oster jun. *RCI Standard* 1960 (6) p 6 (Dec)

Amongst other applications, the use of replica techniques for the study of mechanically polished surfaces is quoted. 4 illustr.

*E* *Chm Unf Vw Wcmm*

**Dual-Amp Precisionaire gage for checking internal grinding work**

Sheffield Corp, Dayton, Ohio. *Machinery, NY* 1960 Vol 67 (4) p 184 (Dec)

The gauge has been developed to aid the rapid grinding of work up to 12 in. id, and is said to combine low amplification, long gauging range, and high amplification close-tolerance inspection in automatic sequence. 1 illustr.

*D* *Ag Chcn Qc Wb*

**Michigan tool lead checking machine**

Michigan Tool Co, Detroit 12, Mich. *Mach Shop Mag* 1960 Vol 21 (10) p 658 (Oct)

Optical instrumentation for setting both the sine bar and the angular dividing head are incorporated on the model 1218-A lead checking machine. The equipment is suitable for checking external or internal leads on helical, spur, and herringbone gears with pitch diameters up to 18 inches. A repeatable accuracy of 0.0001 in. is claimed. *D* *Wc*

**BP 826,970** (July 4, 1956) **J. Houldsworth, A. A. Jones & Shipman Ltd**

**Workpiece gauges**

(21 claims, 8 illustr). *D* *Wbb.545*

**BP 831,200** (Dec 26, 1956) **J. Taylor, British Thomson-Houston Co Ltd**

**Measurement of small areas**

(4 claims, 2 illustr).

*D* *Cw Pr Unr.545*

**USP 2,932,967** (May 27, 1955) **R. H. Prewitt, M. Larson**

**Scratch strain recorders**

A sharp crystal or like scratch element is mounted on an arm over a flat smooth target of silver plated copper to scratch a record on this target as the part on which the gauge is anchored elongates or contracts under load thus moving crystal and target relatively to each other. The instrument is to record loads on a given part over a period of time to facilitate decisions as to retiring a part before an actual failure or to furnish a microscopic record because of its relative immunity to obliteration by heat, fire, or other deteriorating effects of the loads prior to failure as *eg* in aircraft destruction. Various instruments may be scattered over the structure of an aircraft on strategic areas. (9 claims, 10 illustr). Ref cited: 8 USP.

*J* *Unq VW.545*

## HARDNESS AND WEAR TESTING

**Adjustment of Rockwell instruments according to the C scale**

S. S. Stepanov, A. I. Sonval'd. *Zav lab* 1960 Vol 26 (7) pp 887-888; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (7) p 2274 (Oct) (Original in Russian)

*D* *Wghc*

**Metallographic studies on oxidation of niobium**

H. Kjoellesdal, O. J. Krudtaa, P. Kofstad. *J Metallurg Club, Royal Coll Sci & Technol, Glasgow* 1959-60 (12) pp 28-35; *Bull Brit non-ferr Met Ass* 1960 Vol 40 (376) p 541 (Nov)

Results of micro-hardness indentation tests are included. *D* *Bfu Cvdb*

**Effect of gauge on Rockwell hardness testing of brass strip**

D. E. Trout. *ASTM Proc* 1959 Vol 59 pp 212-229; *Bull Brit non-ferr Met Ass* 1960 Vol 40 (376) p 528 (Nov)

Rockwell tests on brass strip, 0.018-0.072 in. thick, showed hardness values to increase with thickness at low thicknesses. Results are reviewed and changes suggested in specifications for minimum strip thickness that can be tested for hardness.

*D* *Bfxc Cvd Unhcd*

**Hardness tester**

Georg Reicherter, Esslingen/Neckar, Germany. *Mach Lloyd* 1960 Vol 32 (23A) p 41 (Nov 12)

Equipped with motor drive and electronic time switch, the Briviscop 187 5M hardness testing machine for Vickers and Brinell determinations operates semi-automatically. By means of a pressure on a key, the thrust member together with the diamond or ball swings automatically to the test position, slowly taking the load to the predetermined value. After the end of the test period, the thrust member is swung back to its original position and automatic cut-off takes place. There are two ranges of measurement.

*D* *Nde Wghc*

**Advance introduces new line of portable hardness testers**

Advance Industries Inc, Cambridge 39, Mass. *Amer Mach* 1960 Vol 104 (23) p 170 (Nov 14)

Two models of hardness testers, which are the first in an entirely new line, provide Rockwell hardness readings for all standard and special scales and use loading and penetrators in accordance with ASME and ASTM specifications. 1 illustr.

*D* *Wghc*

**Chemical analysis aids quality control**

Wickman Ltd. *Metalworking Prod* 1960 Vol 104 (47) pp 81-82 (Nov 23)

Testing forgings, castings, and bar materials for hardness and chemical content before machining gives an accurate indication of the mechanical properties of machine tool components after machining it is said. 2 illustr. *E* *Ps Qd*

**Structure of carburized and carbo-nitrided cases**

S. R. Rouze, W. L. Grube. *Metal Progr* 1960 Vol 78 (6) pp 86-90 (Dec)

Micro-hardness measurements were made on cross sections of the cases with a Bergsmann micro-hardness tester; static load was 5 grammes. Diamond pyramid hardness was calculated and converted into Rockwell C hardness. A photograph shows a hardness indentation made with a light load. 7 illustr.

*D* *Az Bfz Cvdb Wghd/Az Bfz Unhcc*

**Creep and hardness of metals : a physical study**

T. O. Mulhearn, D. Tabor. *J Inst Metals* 1960 Vol 89 (1) pp 7-12 (Sep) ; *Bull Brit non-ferr Met Ass* 1960 Vol 40 (377) p 624 (Dec)

A study of the effect of time of loading on Vickers indentation hardness of metals by measurements on indium and lead from liquid air temperature to 50° C below the melting point, with micrographic examination of the indentations. *D* *Bf Unhcc*

**Refractory compositions based on silicon-boron-oxygen reactions**

H. F. Rizzo, B. C. Weber, M. A. Schwartz. *J Amer ceram Soc* 1960 Vol 43 (10) pp 497-504 (Oct 1)

A Bergsman micro-hardness tester with a Vickers diamond indenter, mounted on a Bausch & Lomb research model metallograph, was used to determine the relative hardness of the various phases present in the sintered specimens. Results are recorded. 8 illustr, 5 tables. *D* *Cvd Nde Wghc*

**Surface re-orientation, friction and wear, in the unidirectional abrasion of graphite**

P. V. K. Porgess, H. Wilman. *Proc phys Soc, Lond* 1960 Vol 76 Pt 4 (490) pp 513-525 (Oct)

Graphite specimens were abraded by emery papers of various particle diameters, and surface structure, friction, and wear were investigated and correlated. A method of comparing the hardnesses of the work-hardened surface regions in terms of abrasion-groove widths is described. The Vickers hardness thus estimated was found to agree with measurements made in the usual way with diamond indenters. 3 illustr, 1 table, 21 ref.

*L* *Bhb Cvd Nde 1456 *Bhb Unhcc Vfd.1456*

**Hardness tester**

Vacuum Specialities Company. *Rev sci Instrum* 1960 Vol 31 (6) p 671 (June)

This hardness tester is designed to make multiple indentations in reactive or heat-sensitive metals at temperatures up to 1,600° centigrade. The indenter is a sapphire point on a molybdenum rod. Micrometer adjustment is featured, making it possible for many closely spaced indentations to be made on one or more specimens held in a molybdenum anvil without loss of temperature or vacuum. 1 illustr.

*L* *Rjf Tdc Wghc*

**New science of ceramics takes hold**

W. W. Austin. *Metal Progr* 1960 Vol 78 (5) pp 88-92, 146, 148 (Nov)

At a recent conference in N Carolina, information was presented relating the mechanical behaviour of ceramics to their fundamental structures. Micro-hardness measurements and special metallographic techniques now have an important part in many research programmes. Knoop micro-hardness tests on a single crystal of sapphire are described, and photographs show indentation patterns obtained. 4 illustr.

*D* *Snb Ubb*Snb Un/Bbd Cvdb*

**DIAMOND TECHNOLOGY**

**First published 1942 as "Production Methods for Diamond and Gemstone." The second edition of this book by P. Grodzinski has been revised throughout and considerably enlarged. 840 pages, 486 illustrations, 94 tables, and indexes. From NAG Press Ltd., 226 Latymer Court, London W 6. 55s 0d, post free.**

**Grit hardness and toughness . . . how does it affect your grinding operation ?**

O. L. Forchheimer. *Grinding & Finishing* 1960 Vol 6 (11) pp 34-36, 39 (Nov)

Two of the most essential qualities of abrasive grain, hardness and toughness, are defined, differentiated, and related to various applications of the most commonly used abrasives. It is stressed that properties other than hardness, *eg* toughness, are of importance in evaluating the usefulness of abrasive materials. Both hardness and toughness must be defined more precisely and this can be done by specifying the test methods used to measure the properties. Knoop hardness based on penetration hardness is a more exact measure than the Mohs scale, which fails to indicate the large differences among the hardest materials in the range 9 (corundum) to 10 (diamond). The effect of crystal position on hardness of the indented crystal and the measurements made on it is explained. Toughness, often considered the most important variable in abrasive technology, is considered with the resistance of the grain to breakdown under forces acting on it during grinding ; these may vary in different abrasive applications and tests to measure toughness are difficult to devise. Two types of test are described, and the importance of chemical reaction between grit and workpiece is explained ; the actual and operational toughness are defined. A special section is devoted to factors affecting the toughness of alumina.

*D* *Pe Rd.21/Rd Unh.21*

**Measurement of hardness at very high temperatures**

L. M. Fitzgerald. *Brit J Appl Phys* 1960 Vol 11 (12) pp 551-554 (Dec)

A new method of determining hardness at high temperatures has been developed and is being used particularly to study materials having melting points in the region of 3,000° C, *eg* the refractory carbides. A suitable surface can be obtained by grinding and diamond polishing a flat face. The possibility of measuring hardness of quite small specimens is important in cases where it is inconvenient to use large pieces of the material under investigation : this is significant in studying, *eg*, diamond and also of single crystals of the other materials. The principle of the method described here is the determination of the height of rebound of a spherical indenter. Tungsten carbide balls of $\frac{1}{8}$ in. diameter are dropped onto the specimen from a height of about 22 inches. The apparatus allows measurements of hardness at much higher temperatures than has been possible with previous testers. The dynamic hardness is given as a function of increasing temperature. Despite some technical difficulties, the reproducibility of the results obtainable suggests the usefulness of the method for studying the mechanical behaviour of materials at very high temperatures. 4 illustr, 4 ref.

*D* *Chm Kmg/Cvd Vbb.1456/F Hz Vbb.1456*

**Temperature-hardness characteristics of tools**

National Twist Drill & Tool Co ; Winter Bros Co. *Machinery, NY* 1960 Vol 67 (4) p 129 (Dec)

*D* *Pd Unh*

**Hardness scales and their relations according to Tabor.** Le scale di durezza e la loro corrispondenza secondo Tabor

A. R. Weill. *Macchine* 1960 Vol 15 (11) pp 993-999 (Nov) (In Italian)

Various forms of hardness testing are described and pictures show the differences between Vickers and Knoop indenters and their impressions in diamonds. Charts show the relations between Mohs, Vickers and Knoop hardness. 10 illustr, 3 tables.

*M* *F:Cvd Nde*F:Cvd Ndg*

**Magnedyne and Introdyne hardness testers**

Advance Industries Inc, Cambridge, Mass. *Machinery, NY* 1960 Vol 67 (4) pp 218, 221 (Dec)

Claimed to combine accuracy and portability with a new loading principle, these testers give Rockwell hardness readings for all standard and special scales. The Magnedyne attaches electro-magnetically to the material to be tested, while the Introdyne is a horizontal unit. The loading of both models has a beryllium-copper spring, thus eliminating all weights, levers, and knife edges and providing permanent calibration. 2 illustr. *D Wgh*

**Notes on mechanical testing techniques at very low temperatures**

J. E. Campbell. *DMIC Memorandum* 43, PB 161193; 1960 8 pp (Feb 19) (OTS $0.50); *Battelle Tech Rev* 1960 Vol 9 (12) p 18 (Dec)

Includes a discussion on hardness tests.
*D Cv.21*

**Method for Vickers hardness test for steel**

Anon. *BSI Oversea and Commonwealth Standards* 1960 p 3 (Nov)

Standard 1501 of the Indian Standards Institution.
*D Bfd Cvd Nde.1456*

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## TRUING OF GRINDING WHEELS

**Carbide insert threading tool cuts tool maintenance costs**

Kennametal Inc, Latrobe, Pa. *Mach Tool Blue Bk* 1960 Vol 55 (12) p 138 (Dec)

Specially designed threading tools with Kendex throw-away carbide inserts are reported to cut tool maintenance costs for a number of missile parts that can be threaded by a single triangular insert. The comparison is made between this tool and special brazed carbide tip threading tools, formerly used. The machining operation is done on a 2A Warner & Swasey machine of 30 hp, using a full flow soluble oil coolant. 2 illustr. *D Ceqbd Pdcb*

**Power-driven dressing tool**

Sidley Diamond Tool Co, Detroit 40, Mich. *Mach Tool Blue Bk* 1960 Vol 55 (12) p 190 (Dec). *Grinding & Finishing* 1960 Vol 6 (12) p 63 (Dec)

The Sidley diamond Crushcutter traverse dressing tool consists of an alloy wheel into which many diamonds in rows are set across the peripheral surface. It is power-driven and electronically controlled with stepless speed variations. The tool is also available as a free running unit, actuated by the grinding wheel itself. It is designed to dress all kinds of grinding wheels on any kind of operation. It is reported that the combined rotary and traversing action of the dressing tool enables wheels to be dressed speedly and accurately with less friction. 1 illustr.
*D Njd.21*

**Mesons magnets and manufacturing . . . tooling up for nuclear research**

T. W. Black. *Tool & Mfg Engr* 1960 Vol 45 (6) pp 37-44 (Dec)

Pole tips with a curved edge are ground with a resin bonded silicon carbide wheel, which is trued to the proper contour with the aid of a curved template and a special dressing fixture. 13 illustr.
*D Ab Bk Cg Psf*

**Dressing thin grinding wheels**

J. Waller. *Industr Diam Rev* 1960 Vol 20 (239) pp 196-197 (Oct)

When a thin rubber wheel has proved unsatisfactory, it is sometimes necessary to dress the standard type of grinding wheel to a very thin section for a particular job, as in an attempt to produce a deep slot in a hardened steel die which raised the problem of overcoming a slightly tapered slot. The difficulties of dressing a standard wheel as required seemed insurmountable until a twin-head diamond holder was devised, for grinding both sides of the wheel simultaneously. A drawing shows how this was done, one holder being fixed and one moving. The attachment has been found superior to a single diamond type of holder in accurate dressing of wheels up to $\frac{1}{4}$ in. thick. 1 illustr. *D Ab Cg Mf Njc*

**A new type of radius dresser for grinding wheels**

J. Waller. *Industr Diam Rev* 1960 Vol 20 (239) pp 198-199 (Oct)

Describes a comparatively simple yet effective wheel dresser which, though still using a rotary motion for making the necessary curve on a wheel, is easy to operate and more adjustable than is usual with such small equipment. Both concave and convex curves can be ground to an accuracy said to be limited only by the operator's ability. Construction is explained with the aid of diagrams. Since only basic operations are needed, the device is within the scope of every workshop, it is said. 3 illustr.
*D Ab Cg Pf Psfc*

**New series expendable diamond dressing tools**

Diamond Tool Research Co Inc, 380 Second Ave, New York 10, NY. *Carbide Engng* 1960 Vol 12 (11) p 34 (Nov)

The new NR series of non-resettable and expendable diamond dressing tools are said to provide for new savings and efficiences in grinding wheel dressing costs. The manufacturer states that only the finest single point diamonds are used in these tools, thus allowing for a maximum number of wheel dressings/tool. Advantages reported include the elimination of resetting and the expenses that go with it, lower initial costs, and inventory reductions since the company maintains large stocks of these tools. The used diamonds can be returned for salvage value. The tools come in a variety of shapes and diamond sizes for all type straight and form dressing needs.
*D Nj.21*

**'Wickman-Scrivener' machine for grinding plane surfaces**

Machine à rectifier les surfaces planes 'Wickman-Scrivener'

Anon. *Mach Mod* 1961 Vol 55 (623) p 76 (Feb) (in French)

Model 824 incorporates a special Diaform dressing device. 1 illustr. *A Chcm Pr Psf*

**Questions and answers . . . on wheel truing**

G. Wickstrom. *Grits & Grinds* 1955 Vol 46 (9) p 14 (Sep)

Excessive truing or dressing may be necessary because of the wheel being too fine or hard for the job. Symptoms of this condition are listed. A partial remedy is to check the diamond truing tool to make sure that the diamond is of adequate size and presents a sharp edge to the wheel. Excessive truing may also be the result of the wheel being too coarse or soft for the job. *E Ab Cg.21*

**Close-up of Chicago—1**

Anon. *Machinery, Lond* 1960 Vol 97 (2501) pp 897-904 (Oct 19)

One photograph shows the Heald 190A Centrimatic internal grinder with two wheels, suitable for rough and finish grinding, mounted on one spindle. The finishing wheel is diamond dressed with the stone in a horizontal position, while the diamond is pivoted slightly upwards for dressing the roughing wheel. As a result, the roughing wheel is of somewhat large diameter, and, with this arrangement, deflation during the finishing cut is said to be largely avoided. 22 illustr.

*D* *Chcn Pr Psf:Njb*

**Chip producing machine tools at the Machine Tool Exhibition, Hanover, 1960 : 7. Grinding machines.** Spanende Werkzeugmaschinen auf der Werkzeugmaschinen-Ausstellung Hannover 1960 : 7. Schleifmaschinen

H. Opitz. *Industr Anzeig* 1960 Vol 82 (89/90) pp 1538-1544 (Nov 8) (In German)

The Carstens cylindrical grinder RESH 450 has a table for the Diaform apparatus for the profiling of the grinding wheel.

The Herminghausen centreless cylindrical grinder is made in four sizes, and its features include a largely automatic truing device. The diamond is positioned by an adjustable motor which works through the diamond carrying spindle, enabling individual setting.

The 'Diskus' dual surface grinder DDS 600 grinds parallel surfaces simultaneously. Two vertical spindles each bear a grinding wheel of 600 mm diameter. For truing, the wheels are put in motion at high speed and brought manually on to the clearance of the truing diamonds. The truing device is built into the stand and works automatically. 24 illustr.

*A* *Chc Pr Psf:Nj.27*

**Chip producing tools at the Machine Tool Exhibition, Hanover, 1960 : 11. Tools and clamping tools, accessories.** Spanende Werkzeugmaschinen auf der Werkzeugmaschinen-Ausstellung Hannover 1960 : 11. Werk- und Spannzeuge, Zubehör

H. Opitz. *Industr Anzeig* 1960 Vol 82 (89/90) pp 1551-1558 (Nov 8) (In German)

The Diaform device made by Industriediamanten GmbH, Hamburg, is mounted on the grinding machine. The movement of the tracer point is transferred to the truing diamond through a pantograph gear by an enlarged template. For rough and finish profiling two diamonds are brought into use consecutively. In this way the second diamond is not used for preliminary rough truing and retains its form longer. The Winter & Sohn Diamantfliese is a diamond covered plate used for truing grinding wheels. The metal plate has a 1 mm thick layer of bonded diamond particles on one surface. Long tool life is claimed since, even after short use of the tool, many diamond particles are utilized. After a time, a rounding of about 0.5 mm occurs on the work edge. This rounding determines the smallest possible inner radius on the profile of the wheel to be trued. 30 illustr.

*A* *Pr.27.322*

**Automatic dresser cuts costs**

Barber-Colman Co, Rockford, Ill. *Tooling & Prod* 1960 Vol 26 (7) p 110 (Oct)

A new automatic dresser is said to reduce direct and indirect tool costs through improved control of sharpening operations done on a No 6-5 hob sharpening machine. Speed, accuracy, finish, wheel wear, diamond life, *etc* are controlled automatically and continuously during sharpening. The machine need not be stopped for dressing. *D* *Nj Psf.133*

**Dressing time reduced to eight hundredths of a minute**

Evinrude Motors. *Grinding & Finishing* 1960 Vol 6 (11) pp 44-45 (Nov)

The problem of dressing and truing, in minimum time, the wheels for precise internal grinding of wrist and crank bores of connecting rods has been solved by automatic diamond dressing. The single point diamond tool automatically makes two passes across the face of the internal grinding wheel as it withdraws from the rough ground piston wrist pin bore. The freshly dressed wheel then makes the finish sizing strokes. A larger internal grinding wheel for sizing the inner diameter of the connecting rod crank pin bore is dressed by a diamond tool between the rough and finish grind of the bore. The wheel dressing between rough and finish grinding is necessary to meet the specifications required. The crank pin bore is also honed after it is finish ground. 2 illustr.

*D* *Agn Ceq:Ab Cg Nj*

**Mipsa type RUS universal grinding machine**

Wickman Ltd, Coventry. *Machinery, Lond* 1960 Vol 97 (2504) pp 1086-1087 (Nov 9)

This Swiss-built machine for high precision work is claimed to maintain limits of ±0.00006 in. under suitable conditions with surface finishes of less than 1 micro-inch. Hydraulic work loading/unloading equipment is available for making the machine fully automatic. A diamond wheel dressing attachment with micrometer adjustment for table mounting is among the four dressers supplied. 1 illustr.

*D* *Chcw Pr Psf:Nj*

**Wickman-Scrivener centreless grinder.** Machine à rectifier sans centres 'Wickman-Scrivener'

Wickman Ltd, Coventry. *Mach Mod* 1960 Vol 54 (621) pp 75-76 (Dec) (In French)

Describes the new Wickman-Scrivener No 1 centreless grinder which can take workpieces from 20 to 75 mm in diameter. Among the notable features of this machine is the infinitely variable motorized truing device which forms part of the standard equipment and which can be used for both wheels. 1 illustr.

*K* *Chcc Pr Psf*

**Finish flat faster with the new Norton 8″ × 24″ Type S-3 hydraulic surface grinder**

E. C. Enos. *Grits & Grinds* 1960 Vol 51 (5) pp 3-7 (May)

Describes the Norton 8 × 24 in. Type S-3 hydraulic surface grinder which has a number of optional features, said to make the model one of the most versatile machines of this type. Among the options available is a system permitting supply of coolant through the wheel so that areas on the periphery can be cooled. Wheel forming attachments are used to generate almost any desired form on the wheel. Carbide tool forms are often ground with diamond wheels, and wheel life is claimed to be lengthened by the unusual stability and almost vibrationsless operation of the machine. Diamond wheels can also be given longer life by optional electrolytic or electro-spark grinding equipment. Another optional item is a wheel guard truing device. 4 illustr.

*D* *Ab Cgh Psf/Al Chc Nv Prx*

**Round Hanover with a camera—2**

Anon. *Machinery, Lond* 1960 Vol 97 (2508) pp 1301-1304 (Dec 7)

Among machines photographed and described is the Spandau type SJPM fully automatic internal and face grinder. Sequence of operation, during which an hydraulically operated device dresses the wheel, is explained. 8 illustr. *D* *Chcn Prs Psfb*

**Diamond dressers**

L. Newman & Co, Oakland 7, Calif. *Tooling & Prod* 1960 Vol 26 (9) p 96 (Dec). *Carbide Engng* 1960 Vol 12 (11) p 36 (Nov)

Two new models of diamond wheel dressers are described. Model 11 is designed for the surface grinder, with or without a magnetic chuck. Model 12 is designed for Cincinnati centreless grinders. Diamond concentration comes in 1/16 and ¼ in. depths, on wheels either ¼ or ½ in. wide. The dressers are set on a tangential angle to eliminate the need for a breaking device. 1 illustr.

*D* *Chcc Pr Nj Psf:Chcm Pr:Nj Psf*

**Crush truing—a digest of useful information on crusher rolls, wheels and techniques—part III**

B. D. Hendrickson (Norton Co). *Grits & Grinds* 1954 Vol 45 (1) pp 11-15 (Jan)

Describes the crush truing process and the results expected from a crush trued wheel. The advantages of both diamond trued and crush trued wheels are given. A table lists wheel recommendations which may be used as a guide in selecting wheels to be crush trued for thread or form grinding. 6 illustr.

*E* *Cg Nv*Cgj/Cgj.1456*

**Recent developments in machine tools as seen from the 1960 exhibitions, and in particular the Chicago Exposition.** Developpements récents de la machine-outil à travers les exposition de 1960 et en particulier celle de Chicago

J. D. Cyssau. *Mach Mod* 1960 Vol 54 (621) pp 19-35 (Dec) (In French)

A general view of the 1960 exhibitions, giving numerous examples under specialised headings. The most important step forward is seen to be the increased interest in numerical control. A section on new developments in wheel truing and dressing is of special interest. It discusses a diamond impregnated dressing wheel manufactured by Landis and a similar system designed by Jones and Lamson which are claimed to assure greater precision and faster truing. The Cincinnati numerical control grinding machine is the first fully automatic machine for cylindrical grinding between centres to be equipped with numerical control. It is claimed to be the most spectacular step in reducing the production costs of workpieces with stepped diameters, since all the manual operations are replaced by automatic methods. The capacity between the centres is 457 × 1,830 millimetres. 23 illustr.

*K* *Cg Nje.27/Pr Wpb.27*

**BP 832,146** **AB Svenska Kullagerfabriken**
(June 24, 1957—conv date, Sweden)

**Methods of and machines for automatic grinding**

Accuracy of a series of similar workpieces ground successively depends on the finish grinding step, spark out step. As the feed of the grinding wheel is step regulated, the truing tool position is modified automatically between the rough grinding operation and the finishing operation according to the duration of the finishing operation of the previously ground workpiece. When the finish grinding time is too short the truing depth is increased, and when the finish grinding time is too long the truing depth is decreased. This is effected by a time relay working with hydraulic or pneumatic pressure and a valve controlled pawl and ratchet device for adjusting the truing tool towards or away from the grinding wheel. (7 claims, 4 illustr).

*J* *Chc Prs.545*

**LITERATURE REQUESTS**
**Please quote the page number of the Bibliography containing the original reference, and the author and title of the article, in all cases.**

**BP 833,316** **Zahnradfabrik Friedrichshafen AG**
(July 5, 1957—conv date, Germany)

**Arrangement for truing profiled grinding wheels for grinding helically toothed involute spur gears**

The truing tool should act along the generating straight line of the helical tooth flank. Up to now the arrangements were bulky or led to faults because of the use of screwing devices. These drawbacks have been overcome by arranging the truing tool on a rolling plate so as to act at the helix angle of the toothing, generating straight line, to the axis of the workpiece, this plate being mounted to roll on a cylinder

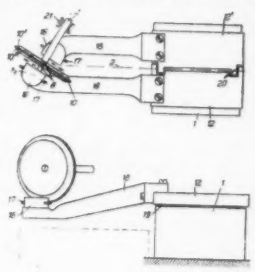
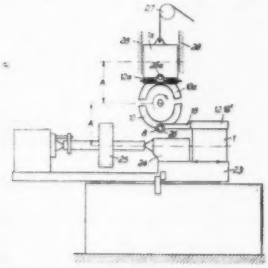


*Fig 1 (top), 2 (centre), and 3 (bottom). BP 833,316.*

parallel to the axis of the workpiece and of a diameter equal to the base circle. As shown in Fig 1 two diamonds 8 for truing faces 10′ and 10′′ are mounted slidable in the direction of axis 17 in heads 16 each fastened at the end of a cantilever arm 18. Each arm 18 is fixed to a plate 12 and 12′ rolling on cylinder 1 by means of bands 19 as seen in Fig 2. Plates 12 and 12′ engage in one another by projecting lugs 20 on which the ends of the bands 19 are fastened. The diamonds are moved in the direction of the double arrows by motors (not shown). Fig 3 shows the installation on the table of a grinding machine behind tailstock 24. 25 is the gear wheel to be ground. Truing is effected by rocking the plates on cylinder 1 while moving diamonds 26 to and fro. (10 claims, 8 illustr).



*J* *Abmd Cgf Nj Psf.545*

**BP 836,479** (Dec 4, 1957) **A. Tickner, Myford Engng Co Ltd**

**Method of mounting the slide in grinding wheel dressing apparatus and for like purposes**

A diamond tool is reciprocated across the face of the grinding wheel by a pinion engaging with a rack on the slide and accuracy is maintained by eliminating back lash and providing for the taking up of any wear which may develop in the slide. The pinion is eccentrically mounted in a sleeve angularly adjustable in the housing carrying the slide and the pinion axle has antifriction bearings which engage with rectilinear faces on the slide. (9 claims, 2 illustr).

*J* *Chc Pr:Nj Psf.545*

**BP 834,852** (Oct 28, 1957) **M. S. Coronel**

**Diamond wheel-dressing or truing-tools**

The diamond tool has one or two pins fitted at right angles to the end of its shank. The part of the shank nearest to the diamond is threaded and a portion between the pin and the thread is unthreaded for receiving a bush with cross slots in which the pin or pins can be fitted so as to locate the tool in certain positions. The shank and bush are then secured together by a nut screwed on to the shank and the assembly is clamped in a tool post. For bringing

another edge of the diamond in contact with the wheel the nut is loosened, the shank turned until the pin or pins fit into another slot, the nut screwed tight again and the tool is ready for use. (4 claims, no illustr).
*J* *Nj.545*

**USP 2,930,111** (Feb 26, 1954) **L. J. St. Clair, Adamas Carbide Corp**

**Tool holder**
(7 claims, 9 illustr). Ref cited : 16 USP ; 1 BP ; 2 FP.
*D* *Psp.545*

**DAS 1,082,828** (July 19, 1958) **K. H. Schulze, Herbert Lindner GmbH**

**Truing device for profiled grinding wheels.** Abrichtvorrichtung für Profilschleifscheiben

The curvature, pointed arch, of the grinding wheel edge is shown in Fig 6. The device is capable of producing this curvature by a combined swinging movement and superimposed template controlled movement of the truing diamond. The diamond 20 in Fig 15 is carried by arm 19 which is connected with slide 14 guided in head 5 in a plane at right angles to shaft 3. The slide contacts with knife edge 18, Fig 17, templates 22, while 23 is pressed upwardly by spring 16 so that the slide is moved transversely during the swinging movement around the axis of shaft 3. The swinging movement is hydraulically actuated by piston 9 and rack 8 meshing with teeth 4. (9 claims, 8 illustr).
*J* *Abm Cg Psf.545*

## PRECISION MACHINING OF METALS

**Attachments for diamond boring of bearing bushings**
V. I. Shekhter. *Mashinostroitel'* 1960 (7) pp 25-26 (July) ; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (7) p 2238 (Oct) (Original in Russian)
*D* *Ayz Cfd Nf Psc*

**Investigating the precision of boring holes on high-precision lathes**
F. P. Duzhenkov. *Trudy MAI* 1959 (116) pp 122-148 ; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (7) p 2238 (Oct) (Original in Russian)
*D* *Az Vfd.1312*

**Diecasting**
H. K. Barton. *Eng Dig* 1960 Vol 21 (12) pp 77-126 (Dec)

Very little machining is said to be needed on most diecast parts since they are produced to close limits. Such operations that are necessary are described briefly. Carbide tipped drills are increasingly favoured. Inserted carbide blades are often used for hollow milling, form cutting, *etc* ; turning and boring are done with Stellite or carbide tipped tools. 103 illustr, 8 tables. *D* *Amz Ceq Pdc/Amz Cfb Pl*

**Tools with finishing edge for finish boring**
V. N. Malikov. *Machines & Tooling* 1960 Vol 31 (7) pp 26-27 (July) (Original in Russian)

Gives results of research into design of fine turning tools. It was concluded that the considerable tool wear experienced makes it irrational to use fine turning tools having a radiused chamfer cutting edge ; fine turning is done better by using tools with an additional cutting edge parallel to the direction of feed ; and tools having a finishing edge increase fine turning productivity by increasing the feed. Machining time is reduced while accuracy and surface finish of the workpiece are improved, it is stated. 4 illustr, 4 ref.
*D* *Ceqbb Pd.21*

**Converted machine bores and hones in one set-up**
H. E. Jackson. *Metalworking Prod* 1960 Vol 104 (51) p 59 (Dec 21)

A gun-boring machine serves as the basis for an unusual conversion which produces bored and honed hydraulic cylinders in one set-up. It can handle work up to 10 ft long and up to 10 in. inside diameter. In many cases no boring is required, as the cylinders can be bought ready for honing, but when both operations are needed, the cylinders are bored from one end and are then honed from the other. 3 illustr.
*D* *Ag Cfd Pr/Ag Chh Pr*

**Oldsmobile machines aluminum for F-85 engines**
G. DeGroat. *Amer Mach* 1960 Vol 104 (20) pp 113-115 (Oct 3)

The 356-aluminium-alloy heads are precipitation age heat treated which makes them tough and stringy to cut. Cutting tool geometry had to be carefully analysed and new designs put into the production line. Much sharper shear angles on cutting tools with significantly higher speeds and feeds were used. 5 illustr.
*E* *Bfg Ceq Pd*

**Threading with carbides**
H. Frommelt. *Carbide Engng* 1960 Vol 12 (11) pp 26-28 (Nov)

Traces briefly the development of threading, describing essential modifications to the lathe to permit threading with carbide. Special reference is made to the Gisholt threading machining, the Cri-Dan. 6 illustr.
*D* *Ceqbd Pdc Pr*

**Tapping high tensile strength alloys with carbide**
J. F. McAuliffe (Pratt & Whitney Co Inc). *Carbide Engng* 1960 Vol 12 (11) pp 16-18 (Nov)

Describes research into the possible tapping techniques for materials harder than Rockwell C 44 in order to reduce costs. 3 illustr, 1 table.
*D* *Ba Cfz Pdc.131*

**Surgical instruments demand top precision**
G. Duffy. *Canad Mach* 1960 Vol 71 (11) pp 70-71 (Nov)

Describes operations on a flexi-collimator made of tungsten copper alloy of which the machining characteristics were unknown. 4 illustr.
*D* *Az Bfxk Ceq*

**Hints on milling beryllium**
Anon. *Metalworking Prod* 1960 Vol 104 (49) p 82 (Dec 7)

Conventional milling rather than climb milling is recommended for beryllium to produce the best finish with the most economical use of cutters. Carbide cutters are recommended for milling beryllium Inserted carbide tooth cutters are favoured. Milling beryllium by precisely controlled chemical erosion is still in the development stage, but it shows considerable promise as a solution to the problem of reducing extremely thin surface areas after conventional milling has been performed. It is also used to remove surface oxides and other impurities.
*D* *Bfu Cff Pdc*

**$CO_2$ coolant makes stainless steel behave**
E. C. Hall. *Metalworking Prod* 1960 Vol 104 (49) pp 91-93 (Dec 7)

Application of carbon dioxide coolant in conjunction with special tool geometry to the machining of stainless steel is said to be showing an outstanding increase in output and tool life. Turning and routing operations on large ring components are considered here. 6 illustr.
*D* *Bfdb Ceq Sj*

**Drilling and boring machine for precise hole locating**

Veet Industries, E Detroit, Mich. *Mach Tool Blue Bk* 1960 Vol 55 (12) p 246 (Dec)

Precision hole locating in two directions can now be performed quickly and accurately on the new Veetmatic radial drilling and boring machine, it is said. The machine can be equipped in three different ways explained here. 1 illustr.

*D* *Cfb Pr Wp/Cfd Pr Wp*

**Ex-Cell-O tape controlled boring machine changes hole dia plus depth and location**

Ex-Cell-O Corp, Detroit 32, Mich. *Amer Mach* 1960 Vol 104 (21) p 160 (Oct 17)

The model 758 boring machine has an incremental Rheem tape positioning system providing control in all axes to increments of 0.0001 inch. The control system positions the work in relation to the boring tool and adjusts the boring tool to the required hole diameter while the spindle is operating. Single point boring operations may be performed with infinite centre locations and variable bore diameters. Accuracy of hole diameter is held within 0.0005 inch. 1 illustr.

*L* *Cfd Pr Wpb*

**Precision lathe, for diamond tools, has wide speed range**

Milo Mfg Co, 259 N Broad St, Elizabeth NJ. *Amer Mach* 1960 Vol 104 (19) p 164 (Sep 19)

This new Bryant Symons precision lathe has an infinitely variable speed drive for spindle speeds in the range from 250 to 2,250 rev/minute. Designed primarily for machining metal components with diamond tools, the lathe also cuts with ceramic and carbide tooling. Two sizes, 8 in. and 13¼ in. are available. Distance between centres is up to 28¼ inches. 1 illustr. *D* *Bf Ceqb Nf Pr*

**Economic machining on the lathe.** Rationelles Arbeiten an der Drehbank

Anon. *Technik u Betrieb* 1960 Vol 12 (11) p 200 (Nov) (In German)

In spite of the introduction of ceramic tools, there is still a wide range of applications for which sintered carbides are necessary. Clamped tools are preferable to brazed tools in many cases, since they are longer wearing and facilitate regrinding. With clamped tools it is only necessary to grind the sintered carbide part, thus saving time and eliminating the need to change grinding wheels. 1 illustr.

*K* *Ceqb Pdc/Ceqb Pdd*

**Metal cutting tools.** Werkzeuge der spanenden Formung

F. Puehler. *Z Ver Dtsch Ing* 1960 Vol 102 (33) pp 1660-1662 (Nov 21) (In German)

Gives a brief and general survey of materials and processes used. Honing is preferred to precision boring for machining drawn steel tubes intended for use as hydraulic and pneumatic cylinders. 5 illustr, 33 ref.

*K* *Bf Ceg Pd*

**Working beryllium [:] How to machine beryllium**

G. A. Toczko, K. Breeze (Beryllium Corp). *Amer Mach* 1960 Vol 104 (21) pp 115-126 (Oct 17)

Machining in general, and specific processes including turning, milling, drilling, grinding, slicing, electrical discharge machining, *etc*, are covered. Carbide tipped tools are generally used for turning, milling, and drilling operations. Beryllium is highly abrasive to all tooling, and the carbide tools should be resharpened as soon as they become slightly dull. The edges should be sharpened on 320-grit silicon carbide wheels, or on 200 to 300 grit diamond wheels. 11 tables.

*L* *Al Bk Chc Nv/Bfu Ceq*

**Hydraulic drilling unit has power indexed turret**

Avey Div, Motch & Merryweather Machinery Co, Cincinnati. *Steel* 1960 Vol 147 (1) p 87 (July 4)

The hydraulic, six spindle, turret drilling machine can perform operations such as drilling, tapping, reaming, boring, countersinking, chamfering, bottom drilling, and deep hole drilling, at one work position. Any spindle may be skip indexed. Drilling capacity in mild steel is 1¼ inches. 1 illustr.

*L* *Cfbz Prx*

**Metal cutting**

J. S. Campbell *et al. Mech Engng, NY* 1960 Vol 82 (9) pp 68-69 (Sep)

Survey papers on metal cutting, published in 1959, under the headings, chip formation, mechanics of metal cutting, tool life and tool wear, machinability, newer machining processes, and vibration. 51 ref.

*D* *Bf Ceg.2231*

**Machining electric motor and shields on a Landis Lund FBI fine-boring machine**

Landis Lund Ltd, Keighley, Yorks. *Machinery, Lond* 1960 Vol 97 (2504) pp 1059-1060 (Nov 9)

3 illustr. *D* *Az Cfdb Pr*

**[Darwins-Fimax magnetic chucks]**

Anon. *Metalworking Prod* 1960 Vol 104 (45) p 13 (Nov 9)

Radial pole permanent magnet circular chucks have magnetized removable central adaptor plugs. In position the plugs permit extension of flux over the full chuck face area, or, when removed, allow drilling or internal grinding to be done at one work setting. Spigoted workpieces can be set concentric, using non-magnetic bushes, and bored workpieces set-up by use of a stub mandrel. Special dynamically balanced chucks are available for very high speeds. 2 illustr.

*D* *Pshz*

**'Cardiff' lathe with copying equipment**

B. Elliott (Machinery) Ltd, Victoria Wks, London NW 10. *Tooling* 1960 Vol 14 (12) p 73 (Dec)

This 9¼ × 80 in. lathe has new improved hydraulic copying equipment which is available for all models in the 'Cardiff' range. These lathes, with their full length cross-slides, are particularly well suited to the application of hydraulic copying attachments, because this arrangement makes it possible to take roughing and finishing passes without reaching over the work to adjust the tool slide on the copier. 1 illustr.

*D* *Ceqbz Pr*

**Automatic diamond boring machine Model OS-173**

Anon. *Machines & Tooling* 1960 Vol 31 (7) pp 40-41 (July) (Original in Russian)

The machine is intended for fine boring of two holes in the outer plate of a coal-cutter chain. Workpiece material is chromium steel and two components are machined simultaneously at the rate of about 500/hour. Sequence of operations is outlined. 1 illustr.

*D* *Bfdz Cfdb Nfz Pr*

**Precision turning machine helps produce accurate memory drums**

Librascope Div, General Precision Inc, Glendale, Calif. *Carbide Engng* 1960 Vol 12 (11) pp 38-39 (Nov)

A new precision turning device, the specially built Van's drum machine, replaces a precision lathe-and-saddle fixture in machining electronic computor memory drums and tolerances in the order 0.00005 inches. 1 illustr. *D* *Agz Ceqb Psc*

**Fundamentals of economic manufacture—20**

W. F. Walker. *Tooling* 1960 Vol 14 (12) pp 37-41, 53 (Dec)

Describes hydraulically controlled copy turning equipment, with particular reference to units for attachment to standard machines. The article concludes with a discussion of some of the chief points of copy-turning technique. 5 illustr.

*D* *Ceqbz.1456*

**Drilling holes to size . . . in one operation**

F. Zagar (Zagar Inc). *Tool & Mfg Engr* 1960 Vol 45 (6) pp 65-66 (Dec)

The tendency of drills to cut oversize can be minimized by using step drills. Even when the pilot is started in an offset position, the body portion of the drill will cut to correct size, it is stated. The importance of careful grinding of step drills is stressed. 3 illustr.

*D* *Az Cfb Wp*

**Crankshafts transfer-broached**

K. W. Hards. *Metalworking Prod* 1960 Vol 104 (45) pp 75-77 (Nov 9)

A transfer broaching unit for machining crankshaft webs prior to pin turning has replaced a battery of six milling machines at Austin Motor Co Ltd. Besides reducing labour requirements from three operators to one, capacity is said to have been increased by 20 per cent. 6 illustr.

*D* *Agn Cfmz Pr*

**Automatic lathe**

Alfred Gauthier GmbH, 14b Calmbach/Enz, W Germany. *Mach Lloyd* 1960 Vol 32 (26A) p 45 (Dec 24)

The Gauthier GM75 automatic lathe is designed for the turning of parts to an accuracy of ±0.0025 millimetre. The machine is fast in operation and can be used where precision turned parts up to 70 mm in length with a maximum diameter of 10.5 mm are required in large quantities. A variety of attachments is available to meet the demands of mass production economically.

*D* *Ceqb Prs*

**. . . Machine aluminum engines for Buick's 'Special'**

G. DeGroat. *Amer Mach* 1960 Vol 104 (20) pp 110-112 (Oct 3)

Among special tools under development is a 13⅝ in. diameter Heald milling cutter with eighteen inserted blades that can be pre-set within 0.0002 in. - 0.0003 in. and then adjusted within 0.0001 in. at the machine. 6 illustr.

*E* *Bfg Cff Pd*

**XXIX International Fair in Poznan.** XXIX Internationale Messe in Poznan

Anon. *Die Technik* 1960 Vol 15 (10) pp 690-699 (Oct) (In German)

Among the machines described is the Sima co-ordinate drilling machine, Omega 2, equipped with decides to facilitate measurements and measurement reading. It can drill to a depth of 25 mm in steel, and 28 mm in cast iron, with a tolerance of 0.02 to 0.007 millimetre. The Disar Electropol 53-C is designed for polishing metallographic specimens. 36 illustr.

*A* *Bfa Chm Pr.27/Cfb Pr.27*

**Machine tools with multiple parallel spindles.** Les machines-outils à broches multiples parallèles

Anon. *Machine-Outil Franç* 1961 Vol 26 (161) pp 89, 91, 93, 95 (Jan) (In French)

Reycord multi-spindle drilling, reaming and lapping machines are discussed. These machines exist in several versions with either one or two columns. The double column version is designed to obtain maximum rigidity with the minimum of wear on the slides. 6 illustr.

*K* *Cel Pr/Cfb Pr/Chd Pr*

**Rapid Re-set milling cutters**

Wickman Ltd, Coventry. *Mach Lloyd* 1960 Vol 32 (20A) p 44 (Oct 1)

The Rapid Re-set system of face milling cutters employs a cutter wheel with replaceable blades which may be in any of three styles. The system simplifies re-servicing by utilizing oft-hand grinding in conjunction with a special grinding jig and setting block. 1 illustr.

*D* *Alc Chc*

**Electric motor production in Japan**

R. E. Green. *Machinery, Lond* 1960 Vol 97 (2511) pp 1448-1455 (Dec 28)

Among operations described is machining end covers on a 6-station rotary transfer machine equipped for facing, turning, boring, and drilling. 10 illustr.

*D* *Psj Qc.373*

**Davis throw-away insert cutters for micrometer-adjustable Super-Mike boring tools**

Davis Div, Giddings & Lewis Machine Tool Co, Fond du Lac, Wisc. *Machinery, NY* 1960 Vol 67 (4) p 190 (Dec)

New cutters with standard throw-away carbide inserts have been designed. The cutters are inter-changeable with standard HSS or carbide Super-Mike cutters. 1 illustr.

*D* *Pdcb*

**The deformation process in metal-cutting**

W. J. McDonald, B. F. Murphey. *ASME Trans, Ser B, J Engng for Industr* 1960 Vol 82 (3) pp 253-258 (Aug); *Battelle Tech Rev—Abstr* 1960 Vol 9 (12) p 738a (Dec) No 13647

An analysis of the orthogonal chip process for a strain-hardening material is presented together with a qualitative evaluation of the effects of temperature increases and of flank rubbing. An expression is derived for the average stress on planes through the tool point ahead of the shear plane.

*X* *Bf Ceq Unk*

**Tool life lengthened by high-pressure spraying of cutting fluid**

A. V. Pakhomov. *Vestn Mash* 1958 Vol 38 (2) pp 55-56; Henry Brutcher Transl No 4556, 4 pp; *Battelle Tech Rev—Abstr* 1960 Vol 9 (12) p 739a (Dec) (Original in Russian)

The wear of the cutting face substantially affects the quality of the machined surface, and this quality was better, over the whole range of tip wear, with spray than with normal cooling.

*X* *Bf Ceq Sjk Uqe*

**The DeVlieg method**

Anon. *Mach Tool Rev* 1960 Vol 48 (287) pp 120-124 (Sep-Oct)

Describes the DeVlieg Jigmil, which because of rigidity of structure and alignment of 0.0001 in./ft, is claimed to have established a method of high precision jigless production in the machining of a wide range of components. Features of the system are listed. 8 illustr.

*D* *Ceq.1456*

**Drilling**

Anon. *Mach Tool Rev* 1960 Vol 48 (287) pp 125-130 (Sep-Oct)

Whilst drilling is usually a simple operation on a drilling machine, its inclusion in a turret lathe or auto-lathe set-up requires careful consideration. Advice is given here. 9 illustr.

*D* *Cfb.21*

## CUTTING & MACHINING OF STONE, ETC

**Control of refractory materials by means of optical, macroscopic, and microscope examination**

Anon. *Refrattari* 1960 (8) p 289 ; *Brit Ceram Abstr* 1960 (10) pp 366A-367A (Oct) (Original in Italian)

Methods of preparing thin sections of compact and friable materials are among topics discussed.

*D* *Rdg Wcm.1312*

**Semiconductors—Their production and properties**

W. H. Dennis. *Metallurgia* 1960 Vol 62 (374) pp 261-264 (Dec)

Refers briefly to the properties of semi-conductors before describing techniques used in the recovery and processing of the three principal ones : germanium, silicon, and selenium. Single crystals of germanium are shaped into square sections and cut onto 0.02 in. wafers by means of a small percision saw of the type used for cutting diamonds. Recently a way of growing germanium crystals as thin flat crystals has been developed which eliminates slicing into wafers, grinding, cutting into squares, and final polishing. 4 illustr, 1 table. *D* *Tn:Qc/Tn U*

**' Plasma ' cutters**

Plasmadyne Corp. *Engng Min J* 1960 Vol 161 (11) p 50 (Nov)

A plasma cutter has been put through a series of tests to see how effectively it can cut through a variety of rocks. The tool was not only able to cut through granite, but, by having its gas temperature lowered, could cause rocks to flow into desired shapes, it is claimed. 1 illustr. *D* *Bn Ceg Pd*

**Machining of plastics**

V. Zilvar, J. Hugo. *Jemná Mechanika a Optika* 1960 (11) pp 329-331 (Nov) (Original in Czech, abstr in English)

Methods of plastics machining are described and kinds of plastics which can be machined by these methods are indicated. In conclusion, the economic substantiation of the plastics technology is given.

*X* *Bp Ceq Unp*

**Effect of certain physicomechanical properties of crystals on the processes of their grinding**

L. F. Grigor'eva. *Inzh-fiz zhur* 1960 (2) pp 36-40 (Feb) ; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (7) p 2273 (Oct) (Original in Russian)

*D* *Bd Chc Ub*

**Even the fuel is machined to ±0.0005 in.**

J. A. Weller. *Canad Mach* 1960 Vol 71 (11) pp 76-81 (Nov)

After sintering, the uranium oxide components are centreless ground with a silicon carbide wheel on a Royal Master grinder equipped with a pneumatically operated automatic feeding device. Tolerance on the diameter of the pellets is ±0.0005 in. at 63 micro-in. r.m.s. surface finish. 22 illustr.

*D* *Az Bfwbz Chcc Pe Rge*

**Glass engraving**

H. Munro. *Glass Age* 1960 pp 40-43 (May) ; *Glass Technol* 1960 Vol 1 (5) p 66A (Oct)

A description is given of the copper wheel engraving lathe and its use in glass decoration. Other techniques are also mentioned, *eg* sand blasting and grinding by means of a variety of electrically driven and compressed air operated tools.

*D* *Bm Cp Pe Sbb*

**Elliott Bros agents for abrasive tool**

Elliott Brothers (London) Ltd, London SE 13. *Metalworking Prod* 1960 Vol 104 (50) p 88 (Dec 14)

An air-powered abrasive jet tool for cutting and abrading hard, brittle materials, operates with a 27 μ aluminium oxide grit with which cuts as fine as 0.008 in. are said to be obtainable. It will cut or abrade almost any hard, brittle material such as germanium, silicon and ferrite ; it can also be used to cut tungsten, and as a deburring tool for oxide solder stripping.

*D* *Ceg Pdd*

**From the field [:] Large coring job at Tantangara Dam**

Associated Diamond Drillers Pty Ltd. *' Mindrill ' Bits & Pieces* 1960 Vol 13 (8) p 4 (Oct)

Forty 12 in. diameter holes were diamond drilled to a depth of 3 ft 6 in. through reinforced concrete. Another job was the drilling of twenty pairs of 12 in. diameter holes to a depth of 3 ft 6 inches. 7 illustr.

*D* *Bny Cfb Nh*

**Grinding of steatitic ceramics**

K. F. Romanov, I. G. Grinchenko. *Machines & Tooling* 1960 Vol 31 (5) pp 31-34 (Original in Russian)

Gives the results of an investigation carried out to find the means and optimum conditions for machining cylindrical, formed components made from ceramics based in talcum with a hardness of Rockwell 50-55. Preliminary investigations have shown that high strength ceramic components cannot be machined with single edge cutting tools, and therefore, should be machined by grinding. It was concluded that preliminary rough and semi-finish grinding of such materials should be done with KZ wheels on ceramic bond, while metal bonded diamond wheels should be used for finish grinding. Wheel speeds and feeds are recommended for types of wheel, and the most suitable coolants are discussed. 7 illustr.

*D* *Bl Chc.1456/Bl Chm Nv*

**Wire stone saws**

Anon. *Wire World Internat* 1960 Vol 2 (5) p 246 (Oct)

A Norwegian firm claims that their wire stone saws work faster and more efficiently than conventional stone saws, cutting profiles, very thin plates, and polished surfaces without marring or deforming the material. Grinding is said to be eliminated. The saws can be used for granite, marble, and any other type of stone, it is said. *D* *Bn Ceg Pcb*

**The 2-m universal reflecting telescope and its equipment**

A. Jensch. *Jena Rev* (Suppl) 1960 Vol 5 (5) pp 8-15 (In English)

The complicated process of grinding and polishing the optical surface was done on the grinding and polishing machine for large optical instruments designed by VEB Zeiss, Jena. 9 illustr.

*D* *Bm Chc Pr Thb Wcm/Bm Chm Pr Thb Wcm*

**The grinding and polishing of plastics.** Schleifen und Polieren von Kunststoffen

W. Burkart. *TZ f prakt Metallbearb* 1960 Vol 54 (9) pp 445-447 (Sep) (In German)

11 illustr. *A* *Bp Chc/Bp Chm*

**Producing polished plate glass of large dimensions**

V. I. Orzevskii, V. I. Vanin. *Steklo i Keram* 1960 Vol 17 (6) pp 13-19 ; *Inhaltsverzeichnisse sowjet Fachzeits* 1960 Vol 9 (10) p 423 (Oct) (In German, original in Russian)

A description of the fully automatic work cycles involved, including the machining of the glass on grinding and polishing machines.

*K* *Bmb Chc Pr/Bmb Chm Pr*

**Some developments in the manufacture and the technical uses of glass**

A. E. Owen. *Sci Progr* 1959 Vol 47 (186) pp 258-273; *Glass Technol* 1960 Vol 1 (5) p 69A (Oct)

Plate glass is now made by the twin grinding system. The production of polished plate glass of exceptional quality, especially from the point of view of optical density, has become necessary. The techniques of making telescope mirror disks out of low expansion borosilicate glass are discussed from the point of view of annealing, grinding and polishing.

*D* *Bmb Chc.1456/Bmb Chm.1456*

**Hydro-pneumatic cutting machine**

Salford Electrical Instruments Ltd; General Electric Co Ltd. *Tooling* 1960 Vol 14 (12) p 76 (Dec)

A hydro-pneumatic machine for cutting semi-conductor crystals and slices and glass tubes for glass to copper seals is now available. Cutting is at stelplessly variable feed rates from 10 to 1,000 in./hour. The machine can index automatically for parallel cuts, the pitch being steplessly variable from 0 to 1 in. by micrometer adjustment. Repetitive accuracy of indexing, is said to be of the order of $\pm 0.001$ inch. The cutter blade is a diamond impregnated or bonded wheel and the high speed spindle unit driving it may be designed for single or two-speed operation and for single or multiple cutting disks of 4 to 6 in. diameter. 1 illustr.

*D* *Bm Ceg Prx*

**Diamond edge on band saws cuts refractory materials**

Anon. *S Afr Min Engng J* 1960 Vol 71 Pt 2 (3533) p 1007 (Oct 21)

A new application for diamonds, as the cutting edge of band saw blades, may solve some 'impossible' cutting jobs in the glass, plastics, ceramics, and stone industries. Standard band saw machines equipped with diamond band saws will cut pattern shapes in refractory materials. Several widths of saw are available, ranging from diamond-coated wire to $1\frac{1}{4}$ in. wide bands which are either edge-coated or fully-coated. The small natural diamond particles are bonded directly to the steel body of the band or wire. Thin materials can be cut without coolant but water or water and oil emulsion is recommended for cutting heavy, dense materials. Standard machine speeds of 1,200 to 1,500 surface ft/min are satisfactory, although the longer bands can be operated at 2,000 surface ft/minute. Special rubber-tyred guide wheels are positioned so as to put tension on the side of the band saw just above the work table and just below it, giving only 10 in. of free saw at cutting point: thus vibration is reduced and the blade protected from twisting and strains. It is stressed that operation must be carefully controlled if full benefits of the diamond cutting material are to be enjoyed. 1 illustr.

*D* *Ba Cej Ngz*

**High speed drill**

Micro Turbines Ltd. *Instrum Pract* 1960 Vol 14 (10) p 1109 (Oct)

A new high speed drill, adapted from the dental drill but with greater reliability, is supplied with two heads, one right angled and the other set at 30 degrees. Both diamond and tungsten carbide tipped cutting tools are available. Estimated speed is about 300,000 rev/min., with, it is claimed, ample torque output to cut all types of material using the appropriate type of cutter. A tank supplies cutting or cooling fluids to the cutter. Possible uses include glass cutting and engraving, die sinking and polishing, compression mouldings, engraving, and watch component manufacture.

*D* *Bm Ceq N/Bm Ceq Pdc*

**Diamond-coated bandsaws do 'impossible' jobs**

L. H. Barron (Dia-Chrome Co). *Amer Mach* 1960 Vol 104 (24) p 151 (Nov 28)

Steel bandsaw blades coated with small natural diamonds are used to make fast contouring cuts in such materials as carbide, glass-reinforced plastics, and ceramics. The technique was developed for laboratory work, but has since become a production tool. The blades are of MC-1 clock-spring steel and may be of any shape or size that will operate in a standard band-saw machine. The best application so far has been for rough, hogging cuts where diamonds cut fast and with minimum vibration. The only necessary change in the machine is to mount rubber tyred guide wheels above and below the table with some 10 in. of tensioned free saw in the cutting area. Coolant should be applied for carbide and heavy ceramics, but plastics may be cut dry. Blade styles include a twist-coated wire, a space-edged blade, and a continuous-edge blade. Hole sawing can also be done. 2 illustr.

*D* *Ba Ceg Ngb Rw*

**BP 836,128** **Fernseh GmbH**

(Oct 29, 1955—conv date, Germany)

**Machine for drilling very fine holes**

In drilling very fine holes *eg* in soft material such as silver frequently employed in electron tube technology the removal of chips and swarf is a difficult problem as the holes may be easily damaged. The difficulty has been overcome by applying thrust to the drill through a weighted lever which is arranged to be lifted out of engagement with the drill intermittently by means of a cam. The duration and frequency of the periods during which the load is removed are preferably made variable *eg* by regulating the speed of the motor driving the cam. An electrical contact may indicate when the desired depth is reached. Lubricant may be fed by a hypodermic needle. The drilling point may be manufactured to a dia as small as 30 $\mu$. The drill shaft may be carried in bearing notches with surfaces of agate or a synthetic jewel. (10 claims, 4 illustr).

*J* *Az Cfb Pr.545*

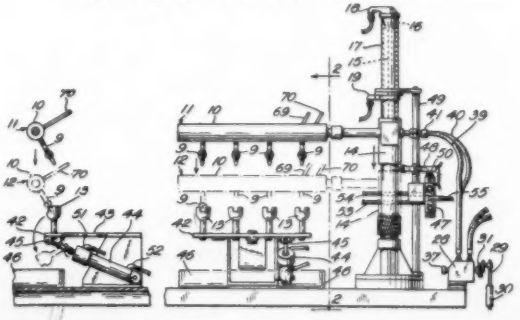
**USP 2,931,351** **J. F. H. Custers, H. B. Dyer, P. D. Wedepohl, De Beers Consolidated Mines Ltd**

(Apr 30, 1957—conv date, South Africa)

**Polishing hard crystalline carbon**

If a diamond is heated in a gas mixture containing oxygen to temperatures much in excess of 600° C certain regions of the diamond suffer more through oxidization than others and the surface becomes rough and pitted. However it has been found that this oxidization can be used to produce a polished face if properly controlled. The method is of particular advantage for industrial diamonds too small or not

*Fig 4 (right), and 5 (left). USP 2,931,351.*



valuable enough for polishing by conventional methods. The treatment is preferably carried out in two stages, first by heating under non-oxidizing conditions to 1,500-3,000° C, then by oxidizing. The apparatus shown in Fig 4 and 5 has a battery of oxy-acetylene torches 9 adjustable in two positions 11 and 12 when their neutral flames, rich in acetylene, are directed into crucibles 13. The movement is automatic, controlled by a pneumatic mechanism. When the required temperature is reached the composition of each flame is altered so that an excess of oxygen is present. The diamonds are fed into the crucibles mechanically and automatically. Best results are achieved when the diamonds are agitated, *eg* the crucibles vibrated during the oxidizing treatment. (8 claims, 8 illustr). Ref cited : 2 USP ; 1 BP ; 1 period.
*J* *F Hp.545*

**FP 1,215,163 H. E. Holman, Electric & Musical Ind Ltd** (Nov 13, 1957—conv date, Gt Britain)

**Method of manufacturing phonograph needles and other like articles.** Procédé de fabricaton des aiguilles de phonographe et autres objets du même genre

The description refers in particular to diamond needles shaped by the application of diamond powder suspended in glycerine but the method may be used for other needles as well as for jewellery with boron carbide or tungsten carbide powder as the abrasive. The rotating needle is exposed to a bombardment of abrasive particles at certain angles in an apparatus schematically represented in Fig 30 and 34 with Fig 31, 32, and 33 showing how modifications of the needle point are produced. A motor 3 rotates a vessel 4 of stainless steel at 1,000 to 6,000 rev/minute. Inclined spindle 11 carries diamond 12 which dips into the cavity formed by semi-circular rim 5. The spindle 11 is rotated by electric motor 16 at 200 to 500 rev/minute. The powder particles which should have a size of between 4 and 6 are collected in the cavity of the vessel by centrifugal force and thus abrade the needle dipped into them. The arrows in Fig 31 to 33 indicate the position of the needle for producing the various shapes of point 21. (19 claims, 8 illustr).
*J* *Qc Tcle.545*

## GEM POLISHING

**New method of cutting**

Industrial Distributors (1946) Ltd. *Diamond News* 1960 Vol 24 (2) p 11 (Nov)

Refers to the cutting of diamond by immersing the stone in paraffin and placing a spring-loaded blade on it. The blade is coupled to an electrical supply at several thousand volts and the diamond beneath the blade is eroded away. A 1/10 in. deep diamond was cut in two in just over two hours.

See *Industr Diam Abstr* 1960 Vol 17 p A282 (Nov).
*D* *F Hp*

**Montres et bijoux**

R. G. A. Cahen. *Diamant* 1960 Vol 4 (25) pp 7, 9, 11, 13, 15, 17 (Oct) (In English, French, and Flemish)

A review of exhibits of this exhibition, held in Geneva from Sep 10 to Oct 2, 1960. 2 illustr.
*D* *Bb.27/F Kb.27*

**FP 1,215,501** (Nov 28, 1951) **P. Nalpern**

**Diamond cutting apparatus.** Appareillage de taille des diamants

The dop is designed to overcome the difficulty of ascertaining the correct angle of applying the diamond to the scaife at the proper direction of the cut. The angle is maintained automatically while testing the direction of cut of a facet. Fig 6 is a view of the dop, Fig 7 a cross section of the dop, and Fig 8 shows the

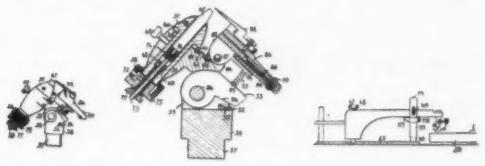


*Fig 6 (left), 7 (centre), and 8 (right). FP 1,215,501.*

arrangement of the dop in its holder over scaife 29 with stop 119 and an indicating control light 114. The diamond in its clamp is held in member 67. The inclination is determined by the adjusted angle of 57. The different facets are obtained by using indexing device 61. (13 claims, 20 illustr).
*J* *F Hl.545*

## ROCK DRILLING

**Jet Blade Diamond Bit**

American Coldset Corp. *World Oil* 1960 Vol 151 (7) p 120 (Dec)

The Jet Blade Diamond Bit, using replaceable jet nozzles, is said to perform exceptionally well in hard and cherty formations. Torque is less than that of a standard diamond bit and less pressure is needed to obtain necessary drilling weight, it is claimed. The jet blade bit contains approximately 3/5 ct weight of a standard diamond bit and substantial savings are also said to result from the reduced torque and pressure. Other advantages are listed.
*D* *Nhb*

**Bi-Center Diamond Bit**

Williams Bit and Tool Co. *World Oil* 1960 Vol 151 (7) p 234 (Dec)

The Bi-Center diamond bit is claimed to pass through a smaller hole than it will cut, follow a roller bit without having to reduce bit size, eliminate tight hole problems, and to have built-in clearance to reduce foreign metallic material. Only part of the od is diamond set. 1 illustr.
*D* *Nhb*

**A drilling experiment using crowns with small diamonds.** Une experience de forage par des couronnes à petits diamants

Ja. M. Chajko. *Prospection et protection du sous-sol* 1960 (2) pp 46-48 (Feb) (In French, original in Russian)

The experiment is described and the conclusion drawn that diamond drilling in the iron stratum of Sheregesh showed considerable advantages over shot drilling ; also the operating speed is three times higher, and costs are lower. It was found that if the rotation speed is 277-350 rev/min, the pressure on the crown is 600 to 800 kg, and amount of drilling fluid required is 30-35 l/minute. 1 illustr, 3 tables.
*A* *Cfb Nh*

**Extension of galleries in Bleiburg.** Der Streckenvortrieb in Bleiberg

H. Rainer. *Montan Rundschau* 1960 Vol 8 pp 156-158 (June) (In German)

For the extension of galleries in lead and zinc mines, Monoblick drills with sintered carbide inserts are used. A tough, hard quality of carbide is preferable for the relatively soft limestone. 2 illustr, 2 tables.
*K* *Bnc Cfb Pl Rh*

**Gyro compass in borehole survey**

Anon. *New Scientist* 1960 Vol 8 (208) pp 1257-1258 (Nov 10)

Reports new use of the idea of photographing the inside of a bore-hole. A gyroscopic compass is allied with the camera, the usual way of orientating the latter being unusable because the holes pass through a large amount of magnetite. Both gyro and compass are served by a cable. Bores are 1,500 ft so far, but depths down to 3,500 ft will be reached, it is predicted.

In this case, photographic survey is satisfactory because work is with an ordinary diamond drill while water is circulated in the hole. During the last ten years, attempts to use a camera in some other mining applications where mud is used as a drilling lubricant have been unsuccessful. The technique is now expanding to use television in the bore hole where hard rock has to be drilled and circulating water is sufficient. This particular survey instrument, devised by Rio Tinto engineers, is 2¼ in. diameter and contained in a waterproof casing.

See also *Industr Diam Abstr* 1960 Vol 17 p A149 (June). *D* *Az Qd Wz/Cfb Nh*

**How research advances grouting techniques at St Joseph Lead**

J. J. Reed, L. Bilheimer. *World Min* 1960 Vol 13 (12) pp 43-45 (Nov)

Describes efforts at the Mine Research Dept of St Joseph Lead Co to put grouting operations on a more scientific and quantitative engineering basis. The emphasis of study was on chemical grouting. American Cyanamid's AM-9 was chosen as being the quickest and simplest way to seal the sandstone formation encountered on the three major grouting jobs attempted. On all these occasions, it was the practice to probe the formation ahead of the shaft with a diamond drill test hole. Flow from the hole was metered at 5-10 ft intervals and all core tested for permeability. The test holes were considered to have been invaluable in planning the chemical grating jobs.

See also *Industr Diam Abstr* 1960 Vol 17 p A190 (Aug). *D* *Bnd Cfb Nh*

**New transistorized electronic instrument to survey boreholes**

Hard Metals Ltd, Sorings. *World Min* 1960 Vol 13 (12) p 49 (Nov)

A new transistorized electronic instrument for surveying deep boreholes is said to offer marked advantages over instruments used at present. All information needed is produced instantly and any number of readings may be taken at varying depths, it is claimed. Principles of construction are outlined.

*D* *Az Qd We*

**Electrodrills used for the first time.** Erstmalig Elektrobohrer eingesetzt

Anon. *Bergbautechnik* 1960 Vol 10 (11) p 605 (Nov) (In German)

Electro-drills were used for the first time in drilling a 5100 m shaft on the Caspian Sea. They drilled much faster than turbo-drills and in 1961 are to be used in the Soviet Union for shafts of 7,000 to 10,000 metres.

*K* *Cfbg Pl*

**Wedging equipment**

Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (7) pp 4-5 (Sep)

Explains modifications to Mindrill wedging assemblies and effect of these on diamond set components.

*D* *Cb N.1451*

**Testing diamond drill bits under controlled conditions**

R. G. Weavind, G. B. Dauncey. *J S Afr Inst Min Metall, J'burg* 1960 Vol 61 (4) pp 245-249 (Nov)

Contributions to discussion on this paper are quoted. Subjects covered include the question of the matrix or binder metal for holding the diamonds, with particular reference to the property of strength at temperature. Field experiments in the Orange Free State quartzites using coring crowns are also described; with the object of seeking greater penetration speeds, the diamond content of the bit kerf was varied by reducing the area to be set both by thickness and by the number of waterways. Conclusions are recorded. 1 illustr.

See also *Industr Diam Abstr* 1961 Vol 18 p A16 (Jan).

*D* *Nh.1312*

**Diamond drill hole deflection [:] Present practice employed in Newfoundland**

Anon. *Diamond News* 1960 Vol 24 (2) p 4 (Nov)

Describes a technique developed by several firms for special conditions where normal diamond drilling could not be used. A modified Thompson weighted-down barrel was successfully developed for obtaining three intersections of the ore seam from a single drill hole, which was directed initially above the seam and deflected downwards at 500 ft intervals.

*D* *Bn Cfb Nh.1456*

**From the factory**

Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (8) pp 4-5 (Oct)

According to experts, the Grundig borehole TV camera is said to open up new possibilities of geological investigation. Among potential applications are hydro dam construction, gallery and tunnel work, general mining, rock anchorage and reinforcement, and general geological exploration. The instrument is only available for use in Nx holes at present. 1 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A248 (Oct). *D* *Cfb Qd Wc*

**Records galore in South African shafts**

Anon. *Min J* 1960 Vol 255 (6539) pp 683-684 (Dec 16)

Describes improved equipment and methods which have enabled further record breaking in high speed shaft sinking; 1,106 ft were sunk in 31 days in the Transvaal. Cover drilling was done by eight Seco 99 14 h.p. diamond drills working below a protective penthouse. Pre-cementation of shaft sites is said to have established the value of the technique during these operations.

*D* *Bn Cfb Nh.1456:.132.361/Bn Cfb Nh.26:.132.361*

**Excursion in Finland, 1960**

A. L. Austen. *Min Mag, Lond* 1960 Vol 103 (5) pp 279-282 (Nov)

At the Otanmaki mine, a compact permeability probe has been developed to survey bore holes. A more reliable evaluation can be made with a probe instrument that determines magnetic field in three dimensions and gives information on the possible size and position of ore not actually traversed by the drill hole. 3 illustr. *D* *Bn Cfb.12.329*

**1,106 feet in 31 days at Harties**

Anon. *S Afr Min Eneng J* 1960 Vol 71 Pt 2 (3536) pp 1207, 1209-1211 (Nov 11)

In order to minimize delays due to the intersection of water-bearing fissures extensive pre-grouting was carried out. Holes were diamond drilled from the bottom of the shaft collar excavation to a depth of approximately 1,600 ft to the base of the dolomite, and cement was then injected under pressure whenever fissures were intersected. 3 illustr.

*D* *Bn Cfb Nh*

**The hydraulic wall-anchored drill collar . . . 60-Pet-46**

J. M. Kellner, A. P. Roberts. *Mech Engng, NY* 1960 Vol 82 (12) p 93 (Dec)

Abstract of paper presented to 1960 ASME Petroleum Mechanical Engng Conference.

To obtain high bit 'weight' near the surface and reduce tripping time at depth, the authors have designed a lightweight, high-output force applicator called the 'hydraulic' wall-anchored drill collar. It has two applications that may result in economic benefits. The first is in drilling near-surface, hard-rock formations, where limitations of drill collar length prevent the use of sufficient bit weight. The second is in drilling at depth with high weights, where its use eliminates the purchase, racking, and hoisting of many drill collar stands, it is claimed.

*D* *Bn Cfb Pl*

**Thread connections in long-hole drilling**

K. F. Lautmann. *Mine & Quarry Engng* 1960 Vol 26 (9) pp 395-398 (Sep)

10 illustr, 1 table. *L* *Cfbz*

**New U.K. diamond drilling records**

Foraky Boring and Shaft Sinking Co Ltd. *Diamond News* 1960 Vol 23 (11) p 17 (Aug)

Over one mile of core has been extracted from one borehole, and this, with the final depth reached, is thought to be a new diamond drilling record for the United Kingdom. Using its standard XXII winch, the company reached a total depth of 5,532 ft at the Wilkesley site, Cheshire. Diamond drilling, used from the start with brine saturaded muds, began with a diameter of 8 in. and ended with one of 3½ inches. A similar rig already holds the record for off-shore diamond drilling at 4,457 ft depth at a point east of Scotland. *D* *Cfb Nh.321*

**Diamond drilling bit lubricant**

P. G. Varley. *Canad Min J* 1960 Vol 81 (7) p 54 (July)

A new drilling lubricant was developed for the purpose of increasing diamond bit life and to reduce friction during the drilling operation. Tests were carried out in various sites all over Canada and resulted in reduced costs in diamond drilling. The diamond is also kept clean and free-cutting, thus increasing speed while reducing wear; footage was increased in almost every case. *L* *Cfb Nh Sk*

**Cables, oil, and oceanography**

T. F. Gaskell. *Times Science Rev* 1960 (38) pp 14, 17-18 (Winter)

Core drilling as a method of investigating the sea-bed is among topics covered. 5 illustr.

*D* *Bz Cfb Plb*

**Industrial notes**

E. J. Longyear Co. *Compr Air (Mag)* 1960 Vol 65 (8) pp 28-33 (Aug)

A section describes two industrial diamond drills developed by the company. The '330' is a swivel type drill of 6 in. capacity and can drill holes at any angle through reinforced concrete, brick, tile and stone. Model '305' is a vertical hole drill of 6 in. capacity, which can also be used for horizontal drilling by the screw feed mechanism being anchored to a wall. The drills have interchangeable air and electric drives, the air motors having been developed because of the great need for diamond drilling in chemical plants and refineries, and on construction jobs where compressed air is the primary source of power. 10 illustr.

*L* *Nh*

**Increasing the life of drill steel**

J. Hjulstad. *Mine & Quarry Engng* 1960 Vol 26 (7) pp 284-296 (July)

Factors that adversely affect the performance of carbide tipped rock drill steel are examined, and correct handling and regrinding are outlined. 25 illustr, 3 tables. *L* *Pl Rw.138*

**Flood diversion at Wyllie's Poort**

Anon. *S Afr Min Engng J* 1960 Vol 71 Pt 2 (3539) pp 1423, 1425 (Dec 2)

Sandvik Coromant were among the drill steels used and all sharpening of tungsten tips was carried out on an Atlas Copco LSB 62 pneumatically operated sharpener. 1 illustr. *D* *Pl*

**Testing diamond drill bits under controlled conditions**

R. G. Weavind, G. B. Dauncey. *J S Afr Inst Min Metall, J'burg* 1960 Vol 60 (12) pp 627-646 (July)

Research at the Diamond Research Laboratory into the various factors met in diamond drilling followed three main lines: (*i*) possible modifications in conventional drill bit design, *ie* diamond pattern and contents, waterways and matrices; (*ii*) relative efficiences of various conventional drilling materials; and (*iii*) the possibilities of treating diamonds to improve their drilling qualities. It was necessary to modify the drilling rig so that all important variables could be controlled, measured and recorded. Granite was used as a standard test material. Blast hole work and cementation were the types of work mainly studied. During the tests, the possibility of improving the drilling qualities of diamonds was investigated and the mechanical process developed whereby imperfect stones were made as sound as the better types of drilling material. Recently, another material derived from a different type of drilling boart has been processed and made available. Results achieved with the improved material are quoted. A new matrix material was also developed and used with the processed diamonds. Among conclusions reached is that, however efficient the machinery and its applications may be, the efficacy of the bit as regards general design, matrix, diamond content and quality, is the governing factor in any successful rock drilling operation. 10 illustr.

*D* *Nhb Uq.1312*

**Rock drills in miniature—CP produce two versatile hand-tools**

Consolidated Pneumatic Tool Co SA (Pty) Ltd. *S Afr Min Engng J* 1960 Vol 71 Pt 2 (3539) p 1435 (Dec 2)

Describes two new models of air-operated self-rotating hand drills, the CP9F and the CP99F, designed for use in the mining, building and allied trades. Either drill will produce accurate holes in materials such as brick, stone, and concrete at exceptional speed, it is claimed. The CP99F is a wet rock drill in miniature, while the CP9F is a dry-type drill with which a quick changeover can be made from rotating drill steels to non-rotating chisels. 1 illustr.

*D* *Bn Cfb Pl*

**DIAMOND TECHNOLOGY**

**First published 1942 as "Production Methods for Diamond and Gemstone." The second edition of this book by P. Grodzinski has been revised throughout and considerably enlarged. 840 pages, 486 illustrations, 94 tables, and indexes. From NAG Press Ltd., 226 Latymer Court, London W 6. 55s 0d, post free.**

**FP 1,214,132** (Feb 27, 1958) **M. G. Ritter, R. Durand, Christensen Diamond Products Co**

**Drilling heads.** Trépans de forage

The fluid flow in the usual rotary heads does not result in uniform lubrication of the drilling faces because zones of high and low pressure occur through changes in the direction of the fluid flow which also means loss

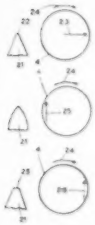


*Fig 9 (top), 10 (centre), and 11 (bottom). FP 1,214,132.*

of drilling power amounting probably to 25 per cent. In a head as designed up till now shown in Fig 9 the fluid flow can be represented as in Fig 10. By changing the shape of the fluid passages to a helix and increasing the cross section of the passages progressively as shown in Fig 11 this loss of power can be avoided. (6 claims, 13 illustr).

*J* *Plb.545*

## WIRE DRAWING

**Briefing the Soviet record . . . for producing superfine wire**

Anon. *Prod Engng* 1960 Vol 31 (50) p 9 (Dec 5)

Mentions two different Soviet techniques for producing wires in sizes down to 2 microns. The original system forced molten metal through very small orifices by high-pressure air or inert gases. A magnetic field is now used, the wire being insulated as it is made. A high-frequency magnetic field draws the molten metal up inside a fine glass capillary tube.

*D* *An Cn.1456.33*

**The fundamentals of wire drawing [:] 6—Profile of a drawing wire**

C. P. Bernhoeft. *Wire Industr* 1960 Vol 27 (324) pp 1197-1198, 1225 (Dec)

1 illustr, 2 tables. *D* *Cn.21*

**Copper wire drawing lubricants**

Anon. *BNF Rev* 1960 (6) pp 14-15 (Nov)

Describes a simple laboratory machine in which lubricants can be subjected to a standard test of their ability to prevent wear between a copper surface rubbing at high speed on a tungsten carbide surface, comparable with that used for wire drawing dies. The accuracy of the machine is at present being assessed. 1 illustr. *D* *An Bfh Cn Sk.1341:W*

**Thinner wires made by rapid process**

Anon. *Financial Times* 1960 (22,241) p 13 (Nov 16)

Copper and manganin wires, 1 μ diameter, can be produced at the rate of 600-800 ft/min and in lengths up to 6,000 ft, using a new technique. The wire rod is fed into a glass tube, the lower end of which is surrounded by an induction heating coil. The top of the rod becomes molten when the current is turned on and the metal is drawn out into a wire, solidified by a cooling device. Experiments are being carried out in an effort to produce single crystals of germanium by the same method.

*D* *An Bfh Cn/Bfr Ct*

**Wet drawing machine**

J. Klasrepohl, Berlin-Borsigwalde. *Wire World Internat* 1960 Vol 2 (5) p 245 (Oct)

Wet drawing machines are required for the production of wire from 3 mm down to the finest dimensions. All such machines are of the multi-hole type and are available with up to 25 die positions. 1 illustr.

*D* *An Cn Sj:Pr*

## GRINDING AND POLISHING OF CARBIDES AND METALS

**Improving reliability of ground parts by avoiding residual stress**

J E. Price (Grinding Wheel Inst). *Tool & Mfg Engr* 1960 Vol 45 (6) pp 75-78 (Dec)

Residual stresses left by grinding can cause premature failure of parts in service. Research has disclosed ways to avoid setting up these stresses. 4 illustr, 3 ref.

*X* *Chc Unqz*

**A new polishing cloth for metal surfaces.** Ein neues Poliertuch für Metallschliffe

Geoscience Instruments Corp, NY. *Werkst u Betr* 1960 Vol 93 (11) p 701 (Nov) (In German)

This comparatively thin cloth is attached to the Pellon polishing wheel, which should rotate at 600 to 900 rev/minute. It is impregnated with the usual polishing materials, dissolved in distilled water with a little glycerine added. It is claimed to produce scratch-free surfaces and a particularly smooth finish, while reducing polishing time by 50 per cent.

*A* *Bf Chm Pez*

**Fatty acids and adhesion of electrodeposited metals**

P. A. Brook (Nottingham Univ). *Nature, Lond* 1960 Vol 188 (4757) p 1183 (Dec 31)

Adhesion was measured with testpieces made of copper. The ends of the specimens to be plated were polished with diamond powder before electro-polishing in 50% phosphoric acid and further treatment. 1 illustr, 2 ref.

*D* *Bfh Chm Km/Bfh Chmk*

**Fluid power provides for automatic grinding processes—Pt 1**

Anon. *Compressed Air & Hydraulics* 1960 pp 329-331 (Aug); *Pera Bull* 1960 Vol 13 (11) p 293 (Nov)

Describes applications of hydraulics and pneumatics in the latest automatic grinding machines.

*X* *Chc Prx.133/Chc Prz.133*

**Grinding wheels and their choice.** Schleifscheiben und ihre Auswahl

H. A. Haase. *Galvanotechnik* 1960 Vol 51 (9) pp 463-465 (Sep) (In German)

The factors important in the choice of abrasive bodies are: workpiece characteristics; the amount of material to be machined; precise dimensions of the workpiece, and surface quality during the finishing process; and the size of the contact surfaces between grinding body and workpiece. The choice of abrasive depends on the physical properties of the material, the quantity of chips desired, and the finish required. In precision grinding, the grinding tool can be dressed with a diamond and the workpiece speed regulated accordingly. 4 illustr. *A* *Ab Cg Nj/Pe.18*

**Plunge-grind output increased by hydraulic actuator**

Federal Products Corp, Providence 1, RI. *Amer Mach* 1960 Vol 104 (23) p 176 (Nov 14)

The Federal-Arnold actuator is an hydraulically operated device for automatic positioning and retraction of a continuous grinding gauge. It reportedly increases both the output and quality of plunge-grind operations because it allows the operator to control two or more machines and makes it impossible for him to overlook using the gauge on any workpiece. 1 illustr.

*D* *Chcd Pr*

**Scientists' Notebook [:] Better polishing by vibration**

Anon. *Financial Times* 1960 (22271) p 11 (Dec 21)

A new vibratory polisher is claimed to be able to polish any number of specimens from 2 to 18 in one loading and to operate without attention. The specimens are put on the abrasive surface and loaded with the weight; the vibratory motion of the table-top develops a polishing action which simultaneously rotates the specimens. Finish obtainable is said to be good enough for electron microscope examination purposes.

*D* *Chm Qn*

**Investigating the surface temperature during grinding**

Sh. M. Dubinskii. *Izv vys ucheb zav mashinostr* 1960 (6) pp 149-154 (July); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (7) p 2273 (Oct) (Original in Russian)

*D* *Chc Vb.1312*

**A breakthrough for stainless producers**

M. M. Patterson. *Grinding & Finishing* 1960 Vol 6 (11) pp 48-51 (Nov)

A wide-belt grinding line developed by Behr-Manning, said to save nearly two-thirds of previous grinding costs, grinds as much as 0.006 in./pass to 34 r.m.s. and holds ±0.00015 in. on stainless steel coils. Of primary importance is control of the crown which is held to 3 per cent. Techniques are described. 5 illustr.

*D* *Az Bfdb Chc Pec*

**Cracks formation and forces in the face grinding of hard alloys**

R. G. Makhkamov. *Izv AN Uz SSSR Ser Tekh nauk* 1960 (3) pp 50-57; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (7) p 2273 (Oct) (Original in Russian)

*D* *Bfxz Chcm Unq/Bfxz Chcm Unt*

**Metallographic technique : Preparation of metal surfaces for micrographic and macrographic examination**

A. Roos. *Bull Brit non-ferr Met Ass* 1960 Vol 40 (377) p 635 (Dec)

Book, Dunod, Paris. 1960, 121 pp. Price NF 13.50.

A short introductory manual of metallographic practice giving, for each stage of preparation, *ie* sectioning, mounting, polishing, etching, a general description together with specific methods for the commoner metals and alloys.

[Not in Library of Industrial Diamond Information Bureau]

*D* *Bf Ceq.52*

**Surface roughness in fine grinding.** Rugosités de rectification fine

L'Abbé Cayère. *Mach Mod* 1960 Vol 54 (621) pp 25-34 (Dec) (In French)

A study is made of the surface roughness in fine grinding, taking as examples a workpiece ground between centres, a ball bearing, a sample of plain grinding, and a group of three diesel crankshafts. In all four examples impurities in the coolant were found to be the main cause of surface roughness. 20 illustr.

*K* *Chcw Unf.21*

**Modern machines and work methods for external cylindrical grinding, Pt II.** Moderne Maschinen und Arbeitsverfahren für das Aussenrundschleifen—II Teil

W. Klemm. *Fertigungstechnik u Betr, Berl* 1960 Vol 10 (10) pp 621-627 (Oct) (In German)

The effective profile of a grinding wheel is the image of the wheed surface at working speed; it has a depth of effective roughness which can be measured with customary surface measuring equipment. The depth of roughness of the workpiece obtained in plunge grinding is directly dependent upon the effective depth of roughness of the grinding wheel. The effective depth of roughness depends upon the shape of the truing diamond, the depth of cut, and the axial speed of the diamond relative to the grinding wheel. It is of particular importance that this axial speed is kept low: it should be 0.1 m/min or even less if small effective depth of roughness is the aim. 16 illustr.

*A* *Chcl Pr:Cg Nj/Chcz Pr:Cg Nj*

**Finishing—$.06 per crankshaft**

Precision Crankshaft Service Inc, Detroit. *Grinding & Finishing* 1960 Vol 6 (11) p 45 (Nov)

Crankshafts and camshafts are polished to a 5 to 6 micro-in. finish with aluminium oxide resin bonded belts made by Michigan Abrasive Company. 1 illustr.

*D* *Agn Chm Pec Rj Urb*

**Diamoil**

International Trading Co (Labs ITC). *Metallurg et Constr Mécan* 1960 Vol 92 (7) p 571 (July) (In French)

In order to remedy the overheating and glazing of diamond grinding wheels, the coolant and lubricant Diamoil was developed some years ago by H. Bertrand. By dislodging particles of carbide embedded in the wheel, this product is said to give faster working times and longer tool life. Even in high speed machines such as optical grinders, heating is reduced to a minimum.

*K* *Nv Sj*

**Strasmann vertical-spindle surface grinder**

Anon. *Mach shop Mag* 1960 Vol 21 (11) pp 715-716 (Nov)

Two tables enable grinding of parts on one to proceed, while setting up, *etc* can be done on the other. The grinding head may be positioned over either table as needed. Normally a 11¾ in. diameter grinding wheel made up of ten segments is used. Automatic sizing equipment may be fitted so that the vertical feed is disengaged when the pre-set size is obtained. Both tables can be magnetized.

*D* *Chcm Pr*

**Wire rod defects—their occurrence and detection**

G. Farnshaw. *Wire World Internat* 1960 Vol 2 (5) pp 233-238 (Oct)

The section on sampling describes grinding technique. Either an abrasive wheel or belt can be used successfully, if belts are changed and wheels are dressed regularly. 10 illustr.

*D* *Az Qj:Anz Chc Pc*

**Safe loading of centreless grinding machines**

Arthur Scrivener Ltd, Tyburn Rd, Birmingham 24. *Mach Shop Mag* 1960 Vol 21 (12) pp 732-733 (Dec)

3 illustr. *D* *Chcc Pr*

**The basis of automatic balancing of grinding wheels using balls**

Yu. S. Reibakh, A. I. Rivkin. *Machines & Tooling* 1960 Vol 31 (5) pp 27-31 (Original in Russian)

6 illustr. *D* *Pe Qq.133*

**Tool improves surface finishes, minimizes parts preparation**

Cogsdill Tool Products Inc, Oak Park 37, Mich. *Carbide Engng* 1960 Vol 12 (11) p 38 (Nov)

A new hole finishing tool works by a process called Roll-A-Finishing, said to reduce 80 - 200 micro-in. surfaces to ±0.0002 to ±0.0025 tolerances and 2 - 10 micro-in. finishes. Parts may be rough bored to tolerances up to 0.005 in. before processing. Principle of operation is explained. 1 illustr.

*D* *Cfdb Pd*

**Five millionths accuracy claimed for rotary table**

AA Gage Co, 350 Fair St, Detroit 20, Mich. *Grinding & Finishing* 1960 Vol 6 (11) pp 86-87 (Nov)

The new Ultraron rotary table is said to have runout and parallelism accuracy of 5 millionths of an inch. Applications include grinding and lapping operations where concentricity, squareness, and parallelism are vital. 1 illustr.

*D* *Chc Pr Psz/Chd Pr Psz*

**Grinding wheel balancing using balls during spindle run out**

Yu. S. Riobakh, A. I. Rivkin. *Machines & Tooling* 1960 Vol 31 (7) pp 14-18 (July) (Original in Russian)

11 illustr. *D* *Pe Psm*

**Match grinding to millionths in minutes**

W. M. Stocker iun. *Amer Mach* 1960 Vol 104 (24) pp 142-143 (Nov 28)

A specially fitted Cincinnati grinder produces parts precise within 0.0000? in., the operation being controlled by Grind-A-Mate. Technique is explained. 4 illustr. *D* *Chcw Pr*

**Resin bonded wheel for faster grinding, finer finishes**

AIT Diamond Tool Co, 8221 N Kimball Ave, Skokie, Ill. *Carbide Engng* 1960 Vol 12 (11) p 34 (Nov)

The resin bonded Forty-Niner Golden Wheel is said to offer finer finishes due to its cool grinding under dry conditions; high tensile strength ensures longer life. The body is of a material which resists expansion and holds the diamond impregnated bond rigidly. The diamond wheel, said to excel in any dry or wet application, is available in grit sizes required by the customer. *D* *Chc Nv Urb*

**What function do grinding fluids perform ?**

J. L. Murray. *Grinding & Finishing* 1960 Vol 6 (11) pp 40-43 (Nov)

2 illustr, 6 tables, 8 ref. *D* *Sjg*

**B11 resinoid snagging wheels—operator's choice**

J. A. Kwasniewski. *Grits & Grinds* 1960 Vol 51 (5) pp 8-15 (May)

Discusses the requirements of grinding wheels in a foundry and the problems B11 bond was designed to overcome. The use of pressure bars for grinding castings of large size is mentioned; one of the advantages of this was that use of a wheel dresser was required less often since the action of the castings themselves dressed the wheel face. 6 illustr. 2 tables.

*E* *Am Chz Pe Urb*

**Advances in oxy-propane cutting**

Anon. *S Afr Min Engng J* 1960 Vol 71 Pt 2 (3536) p 1203 (Nov 11)

Describes a new apparatus for machine profiling with oxy-propane fuel. The system, known as 'Cutomation', incorporates a new type of nozzle with a convergent/divergent interior diamond honed to a tolerance of 0.001 inch. *D* *Az Chh Nqe Tz*

**Chicago Show report [:] Grinders reach for tighter tolerances**

Anon. *Amer Mach* 1960 Vol 104 (19) pp 114-115 (Sep 19)

Outlines technical trends evident at the recent Chicago Machine Tool Exhibition. 5 illustr.

*D* *Pr.27.342*

**Successful internal roller burnishing . . . needs application know-how**

Anon. *Metalworking Prod* 1960 Vol 104 (47) pp 71-74 (Nov 23)

Despite disappointing results due to misapplication, internal roller burnishing of tools is said to offer considerable advantages as a way of producing bores of high quality surface finish. The technique is not for metal removal nor for sizing, except in the case of bronze and some non-ferrous bearing metals, but is primarily for surface finishing. Materials and machining recommendations are made and tool design is covered. 4 illustr, 1 table.

*D* *Agz Bf Chmz*

**Wheel control in grinding operations**

B. O. Morris Ltd, Morrisflex Wks, Coventry. *Metal Ind, Lond* 1960 Vol 97 (25) p 501 (Dec 16)

In many grinding operations the exact moment of contact between wheel and workpiece may be difficult to determine, especially where no spark is afforded by the contact, where remote indication alone is possible, and in very high precision grinding. An electronic grinding indicator has been developed for these situations. Among incidental uses for the instrument is indication of eccentricity in the work, after it has been removed and replaced, and showing spring in the work. In dressing wheels for form grinding, use of the instrument helps to protect the diamond. The start and finish of machining and polishing operations where the tool is out of the operator's circle of vision can also be indicated. 1 illustr. *D* *Nj:Chc Pr Wp*

**Grinding cone pointed parts**

Old Dutch. *Grits & Grinds* 1955 Vol 46 (9) pp 12-13 (Sep)

A simple example illustrates the importance of using the correct grinding method.

*E* *Az Chc*

**The balancing of grinding wheels in the grinding machine.** Das Auswuchten von Schleifscheiben in der Schleifmaschine

H. Klump. *TZ f prakt Metallbearb* 1960 Vol 54 (11) pp 553-556 (Nov) (In German)

The most recent and efficient solution to this problem has been offered by the Reutlinger Eltrodyne device, which incorporates a meter to register the oscillations and sort disturbing waves from other frequencies. The size of the waves is shown on a scaled instrument. It differs from other devices in showing directly at what angle two compensatory weights should be inserted. The 'light place' on the wheel is determined by a stroboscope which is controlled by the irregularity itself. The device is claimed to enable balancing compensation in only a quarter of the time previously required. 8 illustr, 6 ref, 3 tables.

*A* *Pe Psm Wb*

**Relief of residual grinding stresses**

R. O. Lane. *Grinding & Finishing* 1960 Vol 6 (10) pp 32-35 (Oct)

Abrasive tumbling and a brief low temperature salt bath have been found to be the most practical way of relieving residual grinding stresses. These two methods and four others are considered here in the light of research. 9 illustr, 4 ref. *D* *Chc Unq*

**Finish those rolls in less time !**

R. A. Leggett (Behr-Manning Co). *Amer Mach* 1960 Vol 104 (21) pp 103-105 (Oct 17)

As finish is more important than extreme geometrical accuracy in grinding many kinds of rolls and tubes, roll grinding with a belt set-up is said to take about one-third less time and cost less than wheel grinding, while achieving a wide variety of finishes on many types of rolls. Either a lathe attachment or a converted cylindrical grinder may be used. Aluminium oxide is used as the abrasive, and silicon carbide is used for fine finishes. 3 illustr.

*L* *Ag Chct Pee.1456*

**Grinding**

G. Reichenbach. *Mech Engng, NY* 1960 Vol 82 (9) pp 73-74 (Sep)

A survey of papers on grinding published in 1959 points out that investigations of surface structure and of synthetic diamonds received considerable attention. 21 ref.

*D* *Chc Nvh.2231/Chc Ubm.2231*

**The care of sintered carbide tools.** Pflege von Hartmetall-Werkzeugen

Anon. *Draht* 1960 Vol 11 (11) pp 704-705 (Nov) (In German)

Stress is laid on the importance of a smooth groove-free surface for avoiding unnecessary wear, and of not leaving tools untended in the machine for long periods. The use of diamond dust and diamond paste for polishing is discussed: for preliminary polishing Diamix S 20 or Diamix S 30 are suggested; for fine polishing finest diamond dust is recommended and the application described. Because of the great sensitivity of sintered carbide, only diamond grinding wheels should be used. 4 illustr.

*A* *Al Bkc Chm Kmg/Pdc.138*

**Burr grinder dresses its diamond wheel automatically**

Kimbell Machine Tool Ltd. *Industr Equipm News* 1960 Vol 9 (18) p 38 (Mid-Sep)

The Kirner No 30 tungsten carbide grinding machine will grind high speed burrs automatically, economically, and cleanly. The 6 in. diameter diamond wheel is accurately trued to the required angle of cut. The machine can cut spherical burrs from 3 to 24 mm diameter, with a maximum spiral lead about 30° over toothed sections from 2 to 30 mm long.

*L* *Abn Bkcb Chc Nv Prs Psf.133*

**Duplex grinding machine type DRS 700**

Wilhelm Blumberg & Co, Wermelskirchen, Rhld, Germany. *Wire World Internat* 1960 Vol 2 (5) p 255 (Oct)

A special opposed-wheel grinding machine is now available in three sizes for the simultaneous double-ended grinding of cold formed helical springs, taking its place beside conventional machines which grind one end only. The three models of the series are described. 1 illustr.

*D* *Az Chc Pr*

**Versatility of grinder produced by grinding head**

S & S Machinery Co, Brooklyn 32. *Mach Tool Blue Bk* 1960 Vol 55 (12) p 200 (Dec)

The new Elgin ultra-universal tool and cutter grinder Model AUL 500 features a grinding wheel head that produces a versatility said to be hitherto unknown in a tool and cutter grinder. The machine easily handles any type of reamer, tap, threading die, helicoidal drill, hob, single point turning tools, et cetera. It can also be utilized as standard cylindrical, internal, tangential, and surface grinder. 1 illustr.

*D* *Al Chc Pr*

**Shop shots : wheel dressing takes no time**

Jones & Lamson. *Amer Mach* 1960 Vol 104 (18) p 115 (Sep 5)

No extra cycle time is taken by circular diamond cutters to dress aluminium oxide grinding wheels used for grooving propellor shafts for Evinrude outboard engines. The cutters consist of a powdered metal matrix impregnated with small blocky diamond particles and are powered to contact the grinding wheels at the rear of the machine every ten workpieces. The natural diamonds used are said to show no wear after months of application. 2 illustr.

*D* *Ab Cg Nje*

**On centreless grinding in general and its application for grinding threads**

Gy. Szakacs. *Gép* 1960 Vol 12 (2) pp 50-59; *Hungar Techn Abstr* 1960 Vol 12 (3) p 113 (Original in Hungarian)

*D* *Eb.12.3751*

**Belt grinding takes role in precision finishing**

Hill Acme Co, Cleveland, Ohio; Behr-Manning Co, Troy, NY; Wallingford Steel Co, Wallingford, Conn. *Metal Progr* 1960 Vol 78 (5) p 66 (Nov)

A new precision belt grinder is said to be capable of holding thickness variations in steel strip to ±0.0005 inch. Belts are 30 in. wide by 126 in., and for close tolerance work aluminium oxide or silicon carbide bonded with resin to X-weight backing cloth are used. When good surface finishes are the primary concern, serrated rubber rolls are installed in the machines. 1 illustr.

*D* *Chmz Pee Pr*

**Chip producing machine tools at the Machine Tool Exhibition, Hanover, 1960 : 8. Honing, fine-honing, lapping and polishing machines.** Spanende Werkzeugmaschinen auf der Werkzeugmaschinen-Ausstellung Hannover 1960 : 8. Hon-, Feinhon-, Läpp- und Poliermaschinen

H. Opitz. *Industr-Anzeig* 1960 Vol 82 (89/90) pp 1544-1549 (Nov 8) (In German)

The Gehring hand honing machine hones borings between 3 and 60 mm with high precision; it has changeable honing awls in a horizontal spindle, and these are spread apart to allow use of the honing stone. The boring diameter is tested pneumatically during work, and progress can be watched. The Payne Lapmaster is a single-pulley surface lapping machine constructed for lapping, in one automatic process, one side or two sides of the workpieces, which can be of varying measurements and materials. It has only one lapping wheel, on which there are a number of rings to hold the workpiece. The Thielenhaus micro-finish machine KM is a fully automatic machine for the finishing of ball bearing tracks on inner and outer rings; this improves surface finish, and to some extent also precision in form. The workpieces are held hydraulically. 11 illustr.

*A* *Chd Pr.27/Chh.Pr.27/Chm Pr.27*

**New grinding machines at the Machine Tool Exhibition in Hanover.** Neue Schleifmaschinen auf der Werkzeugmaschinen-Ausstellung in Hannover

F. W. Simonis. *Industriekurier* 1960 Vol 13 (141) pp 529-530, 532 (Sep 14) (In German)

6 illustr.

*A* *Chc Pr.27.322*

**Vibrafinish machine for surface machining.** Vibrafinish-Maschine für Oberflächenbearbeitung

Max Spaleck GmbH, Maschinenfabrik, Bocholt, Westf. *Metall* 1960 Vol 14 (12) pp 1201-1202 (Dec) (In German)

*K* *Ceq Qn:Pr*

**Belt grinder finishes honeycomb**

R. L. McKee. *Grinding & Finishing* 1960 Vol 6 (7) p 17 (July)

The best way of finishing honeycomb has not yet been established but abrasive belt grinding is a possibility for all high-production honeycomb grinding and is said to be often the only feasible method with large piece-parts. Performance of a Mattison grinder now being used in the aircraft industry for mass-production grinding is described. 1 illustr.

*D* *Az Chm Pee Pr*

**Alpa surface grinding machines**

Acbars Ltd, 57a Holborn Viaduct, London EC 1. *Machinery, Lond* 1960 Vol 97 (2506) p 1202 (Nov 23)

One of this range, type RV 800, has longitudinal and transverse table movements of 36 and 11 in. respectively. The housing can be raised to admit a workpiece with a maximum height of 16 in. between the wheel and the work-table. All the machine movements are operated hydraulically. 1 illustr.

*E* *Chcm Pr*

**Template grinding machine has new numerical control**

US Army, Pantex Ordnance Plant, Amarillo, Texas. *Canad Mach* 1960 Vol 71 (10) pp 187, 191 (Oct)

This Heald precision contour, boring, and template grinding machine is controlled by a recently developed Bendix 'Precision' 2-axis numerical control system, which controls the motion and feed of both the table slide and cross slide of the machine tool in increments of 0.000025 in., as well as controlling auxiliary functions of the machine. Grinding and machining may be carried out to a tolerance of about 0.0001 in. in the routine production of templates and parts. The machine is said to be a satisfactory solution to the problem of meeting high production requirements on a wide variety of extremely high accuracy templates and contour parts. The tools and grinding wheels are trued to a precise roundness and are checked by a Sheffield optical gauge. 1 illustr.

*L* *Az Chc Pr Wpz*

**Metal machine tool show reflects Italy's metalworking boom**

Anon. *Amer Mach* 1960 Vol 104 (23) p 115 (Nov 14)

Among machines mentioned is the Minganti automatic internal grinder which grinds bearing rings at 150,000 rev/min to a tolerance of 0.001 mm, and which can be installed in an in-line transfer set-up.

*D* *Ayz Chcn Prs*

**V-8 line produces 4-cylinder 'Tempest' engines**

G. DeGroat. *Amer Mach* 1960 Vol 104 (20) pp 116-119 (Oct 3)

Amongst the machining processes is finish grinding on a Landis machine using a 30 in. diameter contour dressed 60-K-grit wheel. Surface finish of about 10 micro-in. r.m.s. is produced with a Cincinnati machine in grinding the prop-shaft bearing diameter to 0.8718-0.8723 inches. 9 illustr.

*E* *Agz Chcw Pr*

**Short honing machine for brake drums.** Kurzhon-maschine für Bremstrommeln

Nagel GmbH, Nuertingen/Wuertt. *TZ f prakt Metallbearb* 1960 Vol 54 (9) pp 443-444 (Sep) (In German)

This machine can hone three drums simultaneously, and the specially developed sorting system ensures quick feed and finishing. The honing tools smooth the rough surfaces to 4 to 8 μ, in 10 to 15 seconds. A special device shows when the honing stones are worn; the machine can hone between 350 and 400 workpieces/hour.

*A* *Az Chh Pr*

**Manual-control surface grinder 20″ table travel, 14″ cross feed**

King Machine & Mfg Co, Los Angeles 11, Calif. *Mach Tool Blue Bk* 1960 Vol 55 (12) p 216 (Dec)

Model K-1020 manual control surface grinder is for either wet or dry grinding. Grinding wheel diameter of 12 in. allows a 15 in. vertical clearance over the table. 1 illustr.

*D* *Chcm Pr Psw*

**Surface grinder has easy moving hand-operated table**

Reid Bros Co Inc, Beverly, Mass. *Mach Tool Blue Bk* 1960 Vol 55 (12) p 260 (Dec)

The new hand-operated 618-HR Rollerway grinder uses precision ground, matched rollers to attain an easy moving hand-operated table. A total of 78 precision rolls support the table and work. This model is also equipped with a table locking device which is said to ensure absolute stability when dressing the wheel. 1 illustr.

*D* *Chcm Pr Psw*

**Landis 6-in. grinder, with numerical control, does in-process sizing of work**

Landis Tool Co, Waynesboro, Pa. *Amer Mach* 1960 Vol 104 (21) p 149 (Oct 17)

The machine is equipped with a Warner & Swasey Probomat numerical control system and holds size and uniformity to about 0.0001 in., giving a 15-micro-in. finish. In addition to controlling wheelhead position and positioning of the work table, the grinder uses the third axis of its control system to do in-process sizing of various diameters under tape control. The machine may also be used as a conventional plain grinder, by turning a selector switch which makes the numerical control inoperative. 1 illustr.

*L* *Chc Pr Wpz*

**Small center lapping machine laps both ends at same time**

J & S Tool Co Inc, Livingston, NJ. *Amer Mach* 1960 Vol 104 (21) p 152 (Oct 17)

The machine was designed for the lapping of centres in small parts, and is suitable for lapping standard and recessed centre holes from 1/16 in. diameter upwards. The machine has two opposing spindles which are individually driven by 10,000 rev/min motors with reversible switches. The centre laps are interchangeable and diamond-impregnated.

*L* *Az Chd Nv Pr*

**Choice of portable grinders**

A. Rakestraw. *Grinding & Finishing* 1960 Vol 6 (10) p 17 (Oct)

Reply to reader's letter.

Some of the basic considerations in deciding whether to use air or electric portable grinders are listed.

*D* *Chc Prw.18*

**Should you use manually stroked honing ?**

B. R. McConnell (Sunnen Products Co). *Grinding & Finishing* 1960 Vol 6 (10) pp 36-39 (Oct)

Manually stroked honing has areas of advantage which are outlined here. 7 illustr.

*D* *Chh.1456*

**Grinder merges backstand idler principle with protability**

Aro Equipment Corp, Industrial Div, Bryan, Ohio. *Grinding & Finishing* 1960 Vol 6 (10) p 52 (Oct)

Said to provide faster grinding and finishing of metal than is possible with any other portable power tool, this new portable belt grinder combines the backstand idler principle of abrasive grinding with power and portability for greater flexibility and efficiency in grinding and finishing operations. 1 illustr.

*D* *Bf Chc Pee Prw*

**Blocky type natural diamond grit now offered on commercial basis**

Industrial Diamond Div, Engelhard Hanovia Inc, Newark, NJ. *Amer Mach* 1960 Vol 104 (23) p 159 (Nov 14)

Following extensive field evaluations, SND-MB (blocky) natural diamond grit is now available on a fully commercial basis. *D* *Kl.251*

**Sterling drill grinder takes minimum time for setup change**

McDonough Mfg Co, Eau Claire, Wis. *Amer Mach* 1960 Vol 104 (23) p 163 (Nov 14)

Grinding 59° drills accurately with a free cutting conical form on all sizes from $\frac{1}{8}$ to $2\frac{1}{4}$ in. diameter can be done quickly on this new Model DF Sterling drill grinder. Because no chucks or collets are required to hold the drills, it takes minimum time to change setups for various sizes, it is said. A built-in diamond wheel dresser is standard equipment. 1 illustr.
*D* *Alb Chc Pr:Nj Psf*

**Surface treatment machines**

Max Spaleck GmbH, Postfach 375, Bocholt iW, Germany. *Mach Lloyd* 1960 Vol 32 (24A) p 49 (Nov 26)

Vibrafinish VFB machines provide an economical means of finishing large batches of parts. Deburring, rounding of sharp edges, surface polishing, *etc*, can all be carried out much more rapidly than with rotary drum type polishing machines, it is said. 1 illustr.
*D* *Chm Pr*

**Automatic in-feed control on an internal grinding machine**

E. S. Zheleznov, V. N. Mikhle'kevich. *Machines & Tooling* 1960 Vol 31 (6) pp 20-22 (Original in Russian)

Investigations into the operation of the internal grinding machine with programme control of transverse feed shows that, while maintaining all the desired technical requirements, the machining time is reduced 1.9-2.5 times compared with grinding on machines without automatic control. The production rate of the machine/shift is increased by 35-50%, depending on the type and size of the components to be ground. The specific consumption of the electrical energy on the modernized machine is considerably less than on the conventional machines. 5 illustr.
*D* *Chcn Pr Wp*

**Kellenberger tool and cutter grinding machine**

Anon. *Mach Tool Rev* 1960 Vol 48 (287) pp 137-139 (Sep-Oct)

Among features of the No 56H model is the patented swivelling grinding head which permits grinding of all angles needed on a cutting tool, and a dividing head incorporating a hardened and ground tool-carrying spindle. Various attachments increase the machine's versatility. 6 illustr. *D* *Al Chc Pr Psc*

**A small efficient surface and tool grinding machine**

Anon. *Mach Tool Rev* 1960 Vol 48 (287) pp 140-141 (Sep-Oct)

The Herbert Junior Surface Grinding Machine has recently been re-designed to incorporate micrometer dials for precision control of longitudinal and transverse movements to the table. The spindle can be fitted with either a Norton Alundum wheel for general-purpose grinding operations, a Norton Crystolon wheel for grinding Ardoloy tipped tools, or a Norton diamond impregnated wheel for such operations as grinding chipbreaker grooves in carbide-tipped tools. Attachments include a radial truing device with diamond tool. 9 illustr.
*D* *Chcm Nv Pr Psfc:Nj Wbd*

**End-mill sharpening fixture includes air-bearing spindle**

Weldon Tool Company, Cleveland 4, Ohio. *Grinding & Finishing* 1960 Vol 6 (10) p 52 (Oct)

The precision spindle is supported by an air bearing to minimize friction. This is said to speed up operation and to enable more sensitive control of the tool. The fixture mounts directly on the table of any tool grinder. 1 illustr. *D* *Chc Pr Psc*

**New internal grinder features increased workhandling capacity, better feed control, new wheelhead mounting**

Heald Machine Co, 15 New Bond St, Worcester 6, Mass. *Grinding & Finishing* 1960 Vol 6 (10) p 51 (Oct)

The Heald 171A internal grinder, available in Size-Matic, Gage-Matic, or plain models, features impulse feeding which is said to make possible straighter bores with smoother finishes for long bore ratios. The new machine can handle workpieces to 8 in. od or 10 in. in special cases; it also has greater angular capacity, taking work with a 90° included angle. Other features are listed. 1 illustr. *D* *Chcn Pr*

**This fixture makes light work of radius grinding**

F. Staudenmaier. *Canad Mach* 1960 Vol 71 (10) p 118 (Oct)

The fixture is said to be particularly useful for grinding concave or convex shapes and is recommended for producing plastic injection dies which sometimes have as many as 100 cavities, each, with radii to grind. Basically, the device consists of a swinging plate which can be positioned in relation to the wheel so that when the workpiece is clamped onto it, the surface to be ground will move against the wheel in a circular path. 1 illustr. *L* *Chcb Psc*

**Plunge grinder wheelhead has no handwheel**

Thompson Grinder Co. *Canad Mach* 1960 Vol 71 (10) p 127 (Oct)

The type CX Plunge-Matic grinder has cybernatic pendent control which eliminates the wheelhead elevating hand wheel. All vertical movement of the wheelhead is carried out through dials on the pendant control. 1 illustr. *L* *Chcd Pr*

**Buffing wheel on surface grinder makes test pieces**

Anon. *Canad Mach* 1960 Vol 71 (10) p 160 (Oct)

Specimens for metal fatigue tests must be manufactured to close dimensional tolerances and without surface defects. Surface irregularities caused by the cutting action of the lathe tool edge must be removed, but hand polishing is very expensive and could lead to inconsistent results. Super-finishing equipment as a lathe attachment was also too expensive and therefore a surface grinder was used with a buffing wheel instead of a grinding wheel. The surface finishes held were under 5 micro-in. and could be reduced to 2 micro-inches. *L* *Chcm Pr Unf:Pez*

**Diskus swivelling-head vertical grinder**

Rockwell Machine Tool Co Ltd, Welsh Harp, Edgware Rd, London NW 2. *Mach Shop Mag* 1960 Vol 21 (10) pp 656-657 (Oct)

Two new models, added to the Diskus range of vertical spindle, swivelling-head surface grinders both have rotary tables and are basically similar. However, the DV300R has a hand traversed wheelhead and the DVA300R a hydraulically operated traverse with automatic adjustment. Coolant supply is standard; other features are described. 1 illustr.
*D* *Chcm Pr*

**Precision machine tool ways — hand scrape ? machine grind ?**

L. W. Collins. *Machinery, NY* 1960 Vol 67 (2) pp 152-156 (Oct)

All bearing ways on a Lees-Bradner spline hobber are finished completely by machine grinding. The tolerance of accuracy is 0.0005 in. maximum in way alignment and flatness, and a maximum of 0.0005 in. on bed twist. 8 illustr, 1 table. *D Ag Chc*

**Grinding machines**

Gottlieb Guehring, Ebingen (Wuerttemberg), Germany. *Mach Lloyd* 1960 Vol 32 (23A) p 37 (Nov 12)

Describes two twist drill point grinding machines of different capacities. Quick change of point angle is claimed and an automatic oscillating device ensures even grinding wheel wear. Twist drills and spiral countersinks with cylindrical and conical shaft and with right or left-hand pitch can be ground. 1 illustr. *D Alb Chc Pr*

**Bench plane grinder.** Rectifieuse plane d'établi

A. de Saint-Alban. *Mécan Elect* 1960 Vol 44 (138) pp 99-100 (Nov) (In French)

LIP have recently brought out their new type 515 I/C, which can be used for dry grinding or sharpening surfaces, grooves, tools, and milling cutters, *etc*, to very fine tolerances and with a very fine finish. 5 illustr. *K A Chc Pr*

**BP 831,595** **Herbert Lindner GmbH**

(Feb 1, 1958—conv date, Germany)

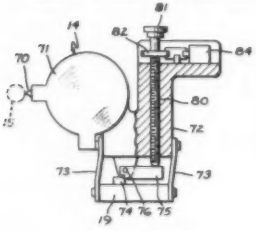
**Feed adjustment devices for thread-grinding machines**

(6 claims, 7 illustr). *D Ceqbd Pr Psf.545*

**USP 2,932,130** (Mar 29, 1957) **H. L. Blood, R. A. Quimby, Heald Machine Co**

**Grinding machine**

In internal grinding the deflection of the wheel spindle may be used after reducing or stopping the feed to determine the size of the bore in connection with a work gauging apparatus or a timing device. The size and shape of a bore however can only be maintained constant if the deflection of the spindle and the length of the spark-out period remain the same for successive



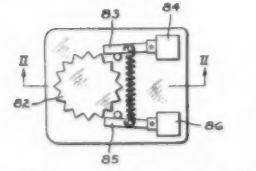




*Fig 12 (top) and 13 (bottom). USP 2,932,130.*

workpieces. Therefore the position of the truing tool is of utmost importance. This position is adjusted in relation to the spark-out period by a comparison between a fine feed period of the wheel head and a predetermined period the adjusting movement being effected when the length of the fine feed period differs from the length of the predetermined period. As shown in Fig 12 and 13, the truing device 14 comprises diamond 70 to be swung into and out of operative position in a conventional manner. Housing 72 is attached to the workpiece support by reeds 73 which are deflected by a lever 75 through pins 74 and 76 adjusted by screw 80 and ratchet devices 82, 83, and 85 operated electrically by solenoids 84 and 86. (15 claims, 8 illustr). Ref cited : 2 USP. *J Chc Pr Psf.545*

**Swiss P 345,459** (Sep 28, 1955) **C. A. Zalud, Titan Abrasives Co**

**Grinding body.** Schleifkörper

The problem of glazing has been very difficult to solve, especially for wheels or rings rotating at high speed with the corresponding development of high temperatures. Glazing is probably due to frictional heat softening the resin bond which then flows over the abrasive particles. It has been found that the danger of glazing can be reduced and the wheel or ring made suitable for various kinds of work, especially for dry grinding of cast iron, steel, *etc* without becoming hot or warped, by adding a filler to the resin bond in certain proportions. 160 parts by weight of abrasive, aluminium oxide, silicon or boron carbide, *etc*, are bonded by 7-14 parts of a thermosetting synthetic resin, Bakelite BR-2417 or Bakelite BR-7534, and at least 67% by weight up to not more than 95% of an organic filler in finely divided form, cryolite, fluorite magnesium oxide, silicon dioxide, et cetera. A good proportion is 10 parts by weight of resin and 30 parts an organic filler. (6 claims, no illustr). *J Pe Urb.545*

**DAS 1,078,486** (Feb 27, 1956) **A. Scholz**

**Porous ceramic abrasive body.** Poröser keramischer Schleifkörper

(8 claims). Ref cited : 1 periodical. *D Pe Unf.545*

**DAS 1,078,898** **Arthur Offen Developments Ltd** (Dec 27, 1952)

**Lapping machine.** Läppmaschine

(8 claims, 9 illustr). Ref cited : 2 DBP ; 2 USP. *D Chd Pr.545*

## MACHINING DEVELOPMENTS

**Ultrasonic impact grinder machines semiconductors**

Raytheon Co, Norwood, Mass. *Grinding & Finishing* 1960 Vol 6 (11) pp 72, 75 (Nov)

A new, faster-operating ultrasonic impact grinder, Model 2-333 is especially designed for precision machining operations in the manufacture of semiconductor and other electronic devices. It can also be used for general purpose work, including cleaning and soldering. *D Ch Prz*

**Wendt electrolytic ' grinding ' machines**

Elgar Machine Tool Co Ltd, Victoria Rd, London W 3. *Machinery, Lond* 1960 Vol 97 (2510) pp 1418-1419 (Dec 21)

Describes PS 60-E tool grinder, and SS 60-E chip-breaker groove grinder, both equipped with the Eleform type ELY 300 generator. 1 illustr. *D Chcr Pr*

**Electro-erosion machines**

Ateliers des Charmilles SA, Geneva ; British rep : Wickman-Electro-Mechanical Dept, Coventry. *Metallurgia* 1960 Vol 62 (374) p 268 (Dec)

The Eleroda Model D.1. is a high precision spark machining unit particularly designed for toolroom applications. Other machines in the Erodomatic range are mentioned. *D Ceqn P*

**Is this the answer to cutting superalloys ? . . . Sub-zero machining**

F. A. Monahan. *Metalworking Prod* 1960 Vol 104 (40) pp 83-91 (Oct 5)

19 illustr. *D* *Bfxz Ceg Vbc*

**More about electro-chemical cutting**

Battelle Memorial Institute. *Metalworking Prod* 1960 Vol 104 (47) p 9 (Nov 23); *Amer Mach* 1960 Vol 104 (23) p 113 (Nov 14)

Two electro-chemical machining units have been produced. One machine contours turbine blades, cutting metal at 0.05 to 0.1 m/minute. The second unit is for electrolytic cutting-off of materials such as tungsten carbide. *E* *Bf Cegz Pr*

**Hot turning superalloy**

Anon. *Metalworking Prod* 1960 Vol 104 (47) pp 85-90 (Nov 23)

The fundamental idea behind hot machining is to reduce shear strength of the work material, thus easing cutting. Experiments discussed, including tool-life tests and cutting tool geometry. A list of safety precautions is given. 8 illustr. *E* *Bfx Ceqbz*

**Some applications of electropolishing**

Haward Corp, North Arlington, NJ. *Machinery, Lond* 1960 Vol 97 (2506) pp 1179-1181 (Nov 23)

3 illustr. *D* *Chmk.1451*

**A spark machining operation on an intricate valve component**

Hydra-Power Corp, New Rochelle, NY. *Machinery, Lond* 1960 Vol 97 (2500) pp 845-846 (Oct 12)

Components must have rectangular ports extending laterally between a 4 in. deep by 0.5 in. diameter blind hole and an adjacent cylinder. The ports are successfully produced by spark machining, using a disk-shaped brass electrode mounted in an offset position on the end of a steel tube. The machine is a Cincinnati Elektrojet, also used for producing accurate square, rectangular, or triangular openings in hardened valve seats, *etc*, which can be cut by direct penetration without lateral displacement. The spark machining operation is said to leave burr-free port surfaces and edges. 3 illustr. *D* *Az Ceqm*

**Spark-gap tracer has magnetic stylus**

Buck & Hickman Ltd, Otterspool Way, Watford. *Metalworking Prod* 1960 Vol 104 (37) pp 76-77 (Sep 14)

Variations in the lengths of spark gaps in the sensing elements of the tracing unit, caused by deflections of the stylus, produce output signals to the servos in a newly-introduced two-dimensional 360° profiling system. The system has other unusual features, including a means of inductively magnetizing the stylus, causing it to travel along the edge of the template at a constant feed rate as the stylus is rotated by a variable speed motor. Backlash is eliminated in the servo-drives by opposed electro-magnetic clutches, and the system is said to be sensitive to stylus deflections of 0.0002 inch. 4 illustr.

*D* *Cpz.1456:Qd Tdb*

**Cutting without scrap [:] New EMI control anticipates tape errors**

Anon. *Metalworking Prod* 1960 Vol 104 (37) p 13 (Sep 14)

Describes a Droop & Rhein FS80 vertical miller, controlled by an Emicon system which anticipates errors and stops the machine before they have been made, thus eliminating the scrapping of valuable workpieces. Other facilities provided by the system are listed. 1 illustr. *D* *Cff Pr Wp*

**Developments in electrolytic machining**

Anon. *Mech World* 1960 Vol 140 (3497) p 501 (Dec)

Electrolytic machining is distinguished from electro-spark machining, the former being electro-chemical by nature and the latter electro-mechanical. However, a common ground of application outlined here is in the recently developed electrolytic cavity sinking processes. Electrolytic grinding may sometimes be used on materials which are adversely affected by heat generated during conventional grinding. Various other comparisons are made between conventional and electrolytic machining processes.

*D* *Ceqh.1456:132*

**Surface finish when spark machining metals**

A. T. Kravets. *Machines & Tooling* 1960 Vol 31 (6) pp 22-25 (Original in Russian)

6 illustr, 4 ref. *D* *Bf Ceqm Unf*

**Electro-contact method of machining external cylindrical surfaces**

M. E. Yukhvid, A. T. Kravets. *Machines & Tooling* 1960 Vol 31 (5) pp 18-21 (Original in Russian)

Gives the main results of investigations carried out in ENIMS on machining rotating surfaces by the electro-contact method. This machining method is similar to grinding on cylindrical grinding machines, or milling with longitudinal feed using slab mills. Experimental set-ups and results are described. 8 illustr, 3 ref.

*D* *Ag Ceqh*

**Machining spline-shafts quickly and accurately by a rolling process (Roto-Flo Machine, Michigan).** Usinage rapide et précis des arbres cannelés par formage (Machine Roto-Flo, Michigan)

C. Macabrey. *Mécan Elect* 1960 (137) pp 109-113 (Oct) (In French)

This new method, which eliminates the removal of material from the workpiece since the splines are formed by shifting the metal, is claimed to constitute an important improvement. 10 illustr.

*K* *Agz Ceq.1456*

**BP 836,182** **Carl Zeiss-Stiftung**

(Mar 6, 1958 ; Nov 20, 1957—conv date, Germany)

**Method and device for working materials by means of a beam of charged particles**

With increasing size of the area to be worked upon there results an ever increasing region of thermally stressed material around the worked area and undesirably large layers at the edge and below the worked area are melted. This can be avoided by using a beam whose working cross-section is smaller than the cross-section of the area to be worked upon and moving this smaller beam over each of the area elements so that the cross-section of the entire worked area is made up of a multitude of worked area elements. (14 claims, 6 illustr).

*J* *B Cfbm Rd.545*

**Swiss P 342,674** (Dec 30, 1955) **W. Ullman, Agie AG für Industrielle Elektronik**

**Method of removing stock by electro-erosion.** Verfahren zur Materialabtragung mittels Elektro-erosion

(2 claims, 9 illustr). *D* *Ceqn.545*

**Swiss P 342,675** (Sep 14, 1957) **N. Mironoff, J. Pfau, Ateliers des Charmilles SA**

**Machine for electric machining.** Machine à usiner électriquement

(1 claim, 2 illustr). *D* *Ceqh Pr.545*

**FP 1,202,147** (Feb 6, 1958) **K. Inoue, Soc Nippon Discharge Machining Laboratory Inc**
**Apparatus for electric spark machining.** Appareil d'usinage par étincelles électrique
(2 claims, 6 illustr). *D* *Ceqm Pr.545*

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## PRODUCTION, GRADING & RECOVERY OF ABRASIVE PARTICLES

**Regular phenomena of the structure of grinding wheels as chipping tools**

J. Peklenik. *Industr Diam Rev* 1960 Vol 20 (239) pp 186-190, 192-195 (Oct)
8 illustr, 4 tables.
See *Industr Diam Abstr* 1960 Vol 17 p A198 (Aug).
*D* *Ceb Pe.21*

**Examine these basics before evaluating fluid-filtering media**

C. H. Hacker. *Prod Engng* 1960 Vol 31 (49) pp 29-40 (Nov 28)
Gives comprehensive filter-media comparison table designed to help choice of filter for hydraulic and pneumatic systems. 8 illustr.
*D* *Pwc.131*

**Abrasives producers launch drive to forge industry-wide standards**

Anon. *Purchasing Week* 1960 Vol 3 (49) p 12 (Dec 5)
The Grinding Wheel Institute has started a drive to develop and recommend abrasives standards. The problem will be studied from a manufacturing, buying, and application point of view.
*D* *Rd.255*

**The diamond mine in your die room**

J. Wiziarde (Elgin National Watch Co). *Wire & Wire Prod* 1960 Vol 35 (10) pp 1364-1365, 1433 (Oct)
It is estimated the wire industry will spend from 8 to 10 million dollars on loose diamond abrasives in 1960 : it is claimed that this total can be cut by 25 per cent. In the choice of diamond, purity and accuracy of particle size grading are the important factors. Loss of finishing efficiency will be in direct proportion to the percentage of impurities present ; undersized particles actually have the same effect as impurities, while oversized particles will cause scratches. The concentration of diamond in the working compound is an important consideration and care must be taken in the selection of grade to achieve the specific finishing result required. It should be remembered that at least a third of the diamond used can be recovered for re-use.
*L* *Fw Hw Nk*

**How more accurate sizing improves corundum quality**

L. P. Dumas (American Optical Co). *Grinding & Finishing* 1960 Vol 6 (11) pp 59-61 (Nov)
Corundum, a natural aluminium oxide, maintains a limited but consistent area of use, mainly in the surfacing of glass. Better sorting of corundum powders improves performance. 3 illustr.
*X* *Bbc Cdd*

**Evaluating resistance of abrasive grits to comminution**

D. E. Cadwell, E. J. Duwell. *Bull Amer ceram Soc* 1960 Vol 39 (11) pp 663-667 (Nov)
5 illustr, 1 table. *E* *Vgf*

**Measuring the grain size of aluminium oxide by a powder reflection method**

E. Fuchs. *Gép* 1959 Vol 11 (12) pp 461-463 ; *Hungar Techn Abstr* 1960 Vol 12 (3) p 97 (Original in Hungarian, abstr in English)
Grain size is determined by the comparison method, that is by comparing the diagrams with those taken from standard specimens of known grain size. Novel features of the method are that the surface to be investigated is located square to the X-ray beam and that it can be installed or removed very quickly. A special advantage of the method is that it makes possible measurements on the cutting edges of ceramic tools which hitherto could not be effected by any other method. As a further advantage, the method involves no losses of material and is non-destructive.
*D* *Vgf*

**Abrasive compounds in barrel finishing**

A. S. Kohler. *Plating* 1960 Vol 47 (1) pp 59-62 ; abstr *J Inst Met* 1960 Vol 88 (10) June : *Metallurg Abstr* 1960 Vol 27 Pt 10 p 690 (June)
The two principal types of grinding compounds are used, respectively, with and without abrasive grains being present. The mechanism of abrasive finishing is discussed with reference to the effects of particle-size and hardness. Particle toughness controls the tendency of an abrasive to break down with increasing tumbling time. *X* *Chmz Rd*

**Grinding and polishing tools made of natural and synthetic diamonds.** Schleif- und Polierwerkzeuge aus natürlichen und künstlichen Diamanten

B. Kleinschmidt. *Industriekurier* 1960 Vol 13 (149) p 570 (Sep 28) (In German)
Hardness and durability are the properties which make diamonds so coveted as tools. A distinction is drawn between crystalline and amorphous diamonds. Industrial diamonds belong to the crystalline, the carbon forms to the amorphous group, found mainly in Brazil and a few South African mines. The diamonds are used in rough or broken form, or they are individually ground as cutting tools. Ballas is a polycrystalline form, in which the crystals are arranged radially, and the diamonds are used mainly for truing tools and boring heads. The uses of natural and synthetic diamonds are considered ; the Wendt Elastik diamond grinding wheel is discussed, and its advantages over the more conventional wheel are mentioned.
*A* *F N.1451/Fh N.1451*

**Testing the grade of grinding wheels**

J. Peklenik. *Microtecnic* 1960 Vol 14 (5) pp 233-238 (Oct) (In English)
The paper is an attempt to define the grade of grinding wheels by means of a measurable, physical magnitude, taking into consideration its statistical distribution, and also to establish a relation with the Norton scale. In order to solve these problems, a new measuring device was developed. It is claimed that the evaluation of test results and their physical interpretation made it possible to solve the problem relative to grinding wheel grade, while illuminating its theoretical and practical significance. The most important part of the device is the scratcher or chisel, which may be made of diamond. (To be cont). 10 illustr.
See also *Industr Diam Abstr* 1960 Vol 17 p A198 (Aug) ; p A325 (Dec).
*D* *Pe.2552:Nc Wb*

**Purchasing Week definition [:] Abrasive materials**

Anon. *Purchasing Week* 1960 Vol 3 (51) p 28 (Dec 19)
Includes a brief definition of diamond.
*E* *Fc U/Rd U*

**Magnetized needle filter**

Stelzner, Essen. *New Scientist* 1960 Vol 8 (208) p 1259 (Nov 10)

A micro-filter isolates ultra-fine particles which pass through the usual filter materials using a cylindrical magnet and a ring of magnetized needles. Coarser particles are removed by a cloth filter incorporated in the device. *D* *Bfy Cc Pwc*

**New development in particle analysis**

Mullards Ltd. *S Afr Min Engng J* 1960 Vol 71 Pt 2 (3539) p 1447 (Dec 2)

An automatic method of particle analysis, in which the sample is examined in the form of a 20 × 20 mm photograph, is of use in studying materials where an analysis of the numbers and size distribution of particles is involved. *D* *Vgf*

**BP 826,392** **Union Carbide Corp** (Oct 14, 1955—conv date, USA)

**Alumina-base cermets**

(8 claims) *D* *Rj.545*

**BP 831,785** (May 28, 1956) **D. E. Urry, Rank Cintel Ltd**

**Apparatus for particle counting and sizing**

(6 claims, 3 illustr). *D* *Vgf.545*

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## TOOL PRODUCTION

**How to cut tool and die costs, Pt 3—Eliminating heat-treat failure**

J. S. Pendleton jun. *Tool & Mfg Engr* 1960 Vol 45 (6) pp 49-51 (Dec)

5 illustr. *D* *Pd.252*

**Steadying the cutting tool**

Anon. *New Scientist* 1960 Vol 8 (208) p 1259 (Nov 10)

A simple, cheap way of reducing vibration in machining operations on vertical boring milling has been developed at Kolomensk machine factory. The device is said to make it unnecessary to reduce cutting speeds in order to prevent vibration even with maximum ram overhang. The method and successful applications are described briefly. 1 illustr.

*D* *Cfb Pr Qn*

**Selection and use of tungsten carbide rotary cutters**

Anon. *The Prod Engr* 1960 Vol 39 (11) p 667 (Nov)

The predominant factors governing the efficient functioning of the tool are classified.

*D* *Alcz Bkcb.18*

**The inspection approach to the essential requirements of the manufacture of centre lathes by line assembly**

N. Brown. *The Prod Engr* 1960 Vol 39 (11) pp 668-674 (Nov)

9 illustr. *D* *Ceqb Pr Qc*

**Machine tool research and design**

Anon. *Metalworking Prod* 1960 Vol 104 (40) pp 11-12 (Oct 5)

The first annual Machine Tool Design and Research Conference was held in September 1960 at Birmingham University. Three subjects of discussion are surveyed here : vibration, metal cutting, and automation.

*D* *Bf Ceg Pr.231/Pr Qn.231/Pr.133.231*

**What's new in the U.S. [:] Drilling metals**

Anon. *Financial Times* 1960 (22237) p 13 (Nov 11)

A new tungsten carbide drill has a lengthwise hole to permit the pumping of coolant to the cutting tip during operation. The cooling fluid, under high pressure, also carries away chips to increase drilling speed. Both drill point and workpiece temperatures are kept below 100° F, the maker says. The carbide tip itself has negative rake to break the chips into small pieces so that the coolant can carry them up the drill hole. The drill was developed primarily for use on the new high-temperature alloys, but it will also increase output in working on more familiar metals, it is claimed.

*D* *Bf Cfb Pl Qr*

**Why and when can ceramic cutting tools be used advantageously ?** Warum Schneidkeramik und wann erfolgt zweckmässig ihr Einsatz ?

F. Altenwerth. *Werkst u Betr* 1960 Vol 93 (7) pp 432-436 (July) (In German)

The conditions essential for the use of ceramic cutting tools are discussed. The very high heat resistance compared with other cutting materials is mentioned, and the reasons for this arise partly from the relatively low inner bond strength, which conditions low resistance to impact stress or vibrations, and, in connection with low heat conductivity, low constancy in changes of temperature. Practical advice is given on how these disadvantages can be overcome. It is pointed out that, in order to avoid micro-fissures, grinding should be done only with diamond wheels. For finish grinding, the resinoid bonded D-50 wheel has proved successful. 12 illustr, 7 ref, 3 tables.

*A* *Bl Chc Nv/Snb U*

**The tungsten carbide rotary cutter**

J. D. Snow. *The Prod Engr* 1960 Vol 39 (11) pp 656-666 (Nov)

A comprehensive article covering structural forms of cutter, manufacture of tungsten carbide, grade selection and testing, production of the tool itself, and cutting of the teeth and flutes. Carbide hardness is of prior importance and high V.P.N. figures must be reasonably stable even at the high temperatures which may occur when cutting hardened die steels. In machining tungsten carbide, electro-erosion and electrolytic grinding are perhaps the most successful for general machining, but technical difficulties remain when cutting sharp-tooth formations across progressively varying profiles. Of the remaining alternatives, apart from ultrasonic applications, grinding by silicon carbide or diamond lapping are superior ; the latter is probably the most efficient way of grinding the tooth-formations in rotary cutters, since a silicon carbide wheel rapidly loses wheel face configuration. Diamond lapping removes the tungsten carbide while giving a high quality finish, keeping a consistency of configuration, and a leaving a minimum of 'white-edge' ; a term related to the crumbling of the cutting edges.

It is stressed that the technique of machining tungsten carbide with diamond tools has many facets which are beyond the scope of the present paper. The diamond wheel construction itself, with diamond grinding, mesh specification, and concentration of impregnation to consider, is of cardinal importance, as are wheel speeds and feeds. Workpiece finish, coolant composition, flow and application, design of wheel spindle and machine as a whole, and methods of maintaining the configuration angles of the wheel are all of equal concern. These factors must be considered individually and collectively if good results are to be obtained. The technique of cutting the teeth must also be carefully considered. 13 illustr.

*D* *Alcz Bkcb Ceq N/Alcz Bkcb Chd Nv/Alcz Bkcb Qd*

**A carbide deposit lengthens the tool life of HSS tools.** Un revêtement de carbure prolonge la durée des outils en acier rapide

C. H. Wick. *Mach Mod* 1960 Vol 54 (621) pp 16-18 (Dec) (In French)

The resilient qualities of HSS can be combined with the hardness of carbides by depositing a layer of carbide on HSS tools, by means of an electric circuit very similar to that used for spark-erosion. The deposit is not a continuous layer, but a series of minute spheres and craters covered with carbide. The life of cutting tools treated in this way has been increased by as much as 400%, but 50% can be taken as a practical minimum. The process is more suited to tools with separate cutting edges such as milling cutters and reamers, but drilling crowns can also be treated in this way. A table showing comparative figures is given. 3 illustr, 1 table. *K* *Pdb Rg Uqc*

**Drilling deep boreholes**

T. F. Gaskell. *Engineering, Lond* 1960 Vol 190 (4924) pp 327-329 (Sep 2)

This article on the Mohole project discusses the fact that diamond bits are being improved at the present time. The metal matrix holding the diamonds is being made tougher, as it is the mounting rather than the diamonds themselves that gives way first. Another development concerns the designing of channels through which the circulating mud flows so that no part of the matrix becomes over heated, or is subject to wear by the rock fragments. 5 illustr, 2 ref.
*L* *Nhb.132*

**Drilling small holes close spaced**

Anon. *Tooling* 1960 Vol 14 (12) p 54 (Dec)

A simple tool facilitates simultaneous drilling of two small holes close together on a conventional drill press. Construction and operation are described. 1 illustr.
*D* *Cfb Pr Psc*

**Progress in the construction and production of Czechoslovakian machine tools.** Progrès dans la construction et dans la fabrication des machines-outils tchécoslovaque

F. Courtaud. *Mach Mod* 1960 Vol 54 (618) pp 101-103 (Sep) (In French)

Among the machines discussed are the surface milling machine, type FRO 8, which can be worked automatically; and the BVA grinding machine with a pilot gauge which can be regulated for finishing cylindrical internal and external surfaces: 0.001 mm precision is said to be obtainable. The IMOS measuring apparatus is used for controlling the precision of gears. 4 illustr.
*A* *Pr.132.326*

**SKF doubles production and cuts costs**

H. N. Werner. *Grinding & Finishing* 1960 Vol 6 (10) pp 24-25 (Oct)

Specialists at SKF Industries Inc had a problem which involved holding a 30 minute angle of ±0.0003 in., with a finish of 25 r.m.s. and parallelism of under 0.0006 in., on the centre flange face of a multi-row bearing's outer race, while maintaining 0.002 in. for size. The solution is said to have decreased losses, increased production by 12%, and increased stock removal rate 310 per cent. Changes in wheel design specifications and dressing technique are outlined. Diamond dressing was reduced to once every ten bearings, compared with the former two dressings/bearing. 4 illustr.
*D* *Ay Ceq Pr Psf:Nj*

**Milling cutter for throwaway inserts**

Adamas Carbide Corp, Kenilworth, NJ. *Carbide Engng* 1960 Vol 12 (11) p 38 (Nov)

A new line of Dex-A-Mil face and shell end milling cutters was especially developed to extend carbide insert life, remove more metal/cutting edge, and to produce exceptionally fine finishes. Greater accuracy has been built-in with a two-piece body construction that is said to enable insert seats to be uniformly ground to extremely close tolerances. 1 illustr.
*D* *Bf Cfj Pdcb*

**Orientation of diamonds for tools by means of an X-ray image intensifier**

J. F. H. Custers, A. J. van der Wagt. *Diamond News* 1960 Vol 23 (11) pp 13-14 (Aug)

2 illustr, 3 ref.
See *Industr Diam Abstr* 1960 Vol 17 p A82 (Mar); p A155 (June). *D* *F Ubc Uklb*

**Cobalt in special steels.** Le cobalt dans les aciers spéciaux

Anon. *Métallurg et Constr Mécan* 1960 Vol 92 (11) pp 901, 912 (Nov) (In French)

General discussion of the use of cobalt in special steels, giving mechanical properties. Sintered carbides are obtained by mixing a hard material such as tungsten carbide with a bond under pressure and at high temperatures. Cobalt is claimed to give the best results as a bonding material for sintered carbides intended for use as cutting tools. 1 ref, 4 tables.
*K* *Rw Sbc Un*

**Reaming polyamide resin components**

L. V. Margolin, N. A. Karacheva. *Machines & Tooling* 1960 Vol 31 (6) p 40 (Original in Russian)

By making the reamer from high carbon steel, a sharper edge can be obtained than when HSS or carbide tipped reamers are used. Machining is done dry at 53 ft/minute. 2 illustr.
*D* *Bo Cel.21*

**Measurements of the wear of grinding disks**

M. R. Besser. *Izmeritel'naya Teknike* 1960 (1) p 17; *SST Sov Sci in Transl* 1960 Vol 4 (2) p 26 (Apr) (Original in Russian)
*D* *Ab Cw*

**Up-to-date methods of testing in the manufacture of grinding wheels**

M. Moser. *Epitoanyag* 1960 Vol 12 (2) pp 66-74; *Hungar Techn Abstr* 1960 Vol 12 (3) p 115 (Original in Hungarian)
*D* *Chcc.21*

**Inauguration of one of the most modern diamond factories in the world**

Anon. *Diamant* 1960 Vol 4 (25) p 26 (Oct) (In English, French and Flemish)

Refers to the opening of the SA Mazal diamond factory at Ypres. 3 illustr.
*D* *F.263.3235*

**Sine bar for angular grinding**

J. H. Sperman. *Metalworking Prod* 1960 Vol 104 (45) p 105 (Nov 9)

1 illustr. *D* *Chcm Pr Wbh*

**Eleven considerations for improving the services of cutting tools.** Undici punti per migliorare le prestazioni degli utensili da taglio

F. J. Sherman. *Macchine* 1960 Vol 15 (12) pp 1161, 1163, 1165, 1167, 1169, 1171, 1173 (Dec) (In Italian)
*M* *Pd.138*

**Chip producing machine tools at the Machine Tool Exhibition, Hanover, 1960 : 5, Sawing and filing machines.** Spanende Werkzeugmaschinen auf der Werkzeugmaschinen-Ausstellung Hannover 1960 : 5. Säge und Feilmaschinen

H. Opitz. *Industr Anzeig* 1960 Vol 82 (89/90) pp 1533-1535 (Nov 8) (In German)

The Thiel precision filing and sawing machine Produro 115 works every kind of hard or hardened material with diamond saws, files, and grinding materials. It is set for sintered carbides, but when circular diamond tools are to be used, rotation speed can be increased to 12,000 rev/min can be set up. 9 illustr. *A* *Pr.27.322*

**News of the industry [:] Gloucester**

Impregnated Diamond Products Ltd, Gloucester. *Machinery, Lond* 1960 Vol 97 (2501) pp 921-922 (Oct 19)

The company have recently developed an improved hone which is claimed to be superior to those previously supplied due to a new bonding method for retaining the diamond particles. Other products are 0.008 in. thick disks for cutting germanium, *etc*, and diamond edged circular saws up to 10 ft diameter for cutting slate and granite.
*D* *Bfr Ceg Nv/Bnq Ceg Ng/Nqe.132*

**Swiss P 342,676** (June 4, 1958) **J. Pfau, N. Mironoff, Ateliers des Charmilles SA**

**Electrode for electro-erosion and method of manufacturing this electrode.** Electrode pour l'électro-érosion et procédé de fabrication de cette électrode
(2 claims, 8 illustr). *D* *Ceqn Ptc.545*

## POWDER METALLURGY

**Powder metallurgy : The manufacture and testing of metal powders**

I. Jenkins.. *Soc Chem Ind Symposium on Powders in Industry* 1960 22 pp (Sep) ; *Bull Brit non-ferr Met Ass* 1960 Vol 40 (376) p 585 (Nov)

A concise account of manufacture, properties, and testing. *D* *Vwlb*

**Powders in industry**

S. H. Bell. *Nature, Lond* 1960 Vol 188 (4757) pp 1161-1162 (Dec 31)

At the first symposium of the Surface Activity Group of the Society of Chemical Industry, topics covered included the problems of powder metallurgy and particle size, shape and surface areas of industrial powders. *D* *Vwlb.541*

**Combination of metals gives faster cutting**

Ferro Powdered Metal Inc. *Prod Engng* 1960 Vol 31 (49) p 16 (Nov 28)

A faster rate of metal removal through reduced vibration and heat is said to be possible with a new copper-infiltrated, powder iron cutting tool. Tool life is said to be 4 to 5 times that of conventional tools. In addition, carbide, ceramic, and cermet cutting element inserts may be locked into the tool by a patented process.

See also *Industr Diam Abstr* 1960 Vol 17 p A199 (Aug) ; p A295 (Nov) *D* *Bf Ceq Pd*



**Spherical metal powders**

Union Carbide Corp. *Metalworking Prod* 1960 Vol 104 (47) p 90 (Nov 23)

Describes a process for producing spherical metal powders ranging in size from 20 to 150 micron. Such powders may be used to fabricate sintered bodies requiring controlled porosity.
*E* *Bfy Qc*

**Metallurgy in nuclear power technology [:] 5. Fuel element canning materials—pt II**

J. C. Wright. *Metal Treatm* 1960 Vol 27 (183) pp 511-517 (Dec)

Sintered powder compacts give a better machining finish than cast beryllium, although powder products may contain more oxide, which is very abrasive : this limits the life of high speed tools to the extent that it may be advantageous to use carbide tipped tools. Standard machining operations may be applied to niobium if care is taken to minimize seizing and galling. Heavy cuts are preferable, using high speed tools with adequate clearance around the cutting edge. 4 illustr, 2 tables. *D* *Pd Qc Qt*

**Cemented [sintered] hard metals — their basis with particular reference to the tungsten-carbide cobalt system**

H. H. Doeg. *J S Afr Inst Min Metall, J'burg* 1960 Vol 60 (12) pp 663-687 (July)

The paper is a review of literature dealing with fundamentals of the tungsten-based hard metals. The manufacture of these alloys is briefly described. Physical metallurgy at all stages of the manufacturing process is discussed in terms of the properties of the finished hard metal alloys. Hardness tests are usually Vickers pyramid hardness or Rockwell 'A'. Microhardness is gaining in popularity for special purposes. 13 illustr, 26 ref. *D* *Bfkk U/Bfxk Cvd*

## MISCELLANEOUS

**Reviewing the US Machine Tool Exposition—1960 [:] What is on show at Chicago**

Anon. *Metalworking Prod* 1960 Vol 104 (37) pp 11-13 (Sep 14)

Nearly 100 exhibits featured some form of numerical control. The applications range from centre lathes and profile grinders to the more familiar co-ordinate drillers, contour millers, and jig borers. By far the largest group of numerically-controlled machines was that for drilling and boring. Interesting applications in contour grinding are illustrated. A large Thompson grinder has an eight-diamond punched tape system for grinding continuous path contours in both vertical and horizontal planes. Other developments in grinding techniques are noted. 1 illustr.
*D* *Chc.1456:.132/Pr Wpz.27.342*

**Mile stones in the development of cutting materials.** Meilensteine in der Entwicklung der Schneidstoffe

Anon. *Technica* 1960 Vol 9 (25) p 1615 (Dec 2) (In German)

1 illustr. *A* *Rc.132*

**Revolving work table**

H. W. Kearns & Co Ltd, Broadheath, Nr Manchester. *Mach Lloyd* 1960 Vol 32 (26A) p 37 (Dec 24)

A revolving work table with multi-jack lifting arrangement is now available for Kearns horizontal boring machines. The table is of cellular construction and is available in sizes ranging from 3 to 6 ft square. 1 illustr. *D* *Psw*

**Factors affecting the tool wear cutting time relationships for tools**

J. Taylor. *Machinery, Lond* 1960 Vol 97 (2500) pp 853-859 (Oct 12)

11 illustr. *D* *Pd Unr*

**Accuracy of automatic sizing systems**

S. S. Volosov. *Machines & Tooling* 1960 Vol 31 (6) pp 12-15 (Original in Russian)

4 illustr, 2 ref. *D* *Cz.133*

**Abrasive belt lengths standardized**

Anon. *Grinding & Finishing* 1960 Vol 6 (10) p 31 (Oct)

The Coated Abrasives Manufacturers' Institute has now embarked on a programme to standardize belt lengths. 1 illustr. *D* *Pee.255*

**Quick way to develop consistent feed and speed tables**

T. Johnson. *Metalworking Prod* 1960 Vol 104 (41) pp 83, 86-88 (Oct 12)

3 illustr. *D* *Uqf.513/Uqff.513*

**Magnetic stand for portable drills**

Magco Ltd, Porchester, Hants. *Engrs' Dig* 1960 Vol 21 (10) p 119 (Oct)

'Magcodrill' magnetic stands, designed to be placed anywhere on a steel plate or other magnetic material, are said to provide the facilities available with radial drills in many applications. Stands are available to take drills up to 1¼ in. and certain models provide for a 1 in. change of radius through an angle of 350° for easy location. 1 illustr. *D* *Pl Psez*

**Use of sub-standard cemented [sintered] carbide cutting tools in watch production**

Z. Smida. *Jemná Mechanika a Optika* 1960 (11) pp 346-351 (Nov) (Original in Czech)

The author points out a maximum accuracy in the technology of watch production and by studying the micro-structure of particular sorts of sintered carbides evaluates their ability to be used in tools for watch parts machining. Some sintered carbide cutting tools used in watch production and their essential technical data are presented. *D* *Az Ceq Pdc*

**Machine control system**

Moog Servocontrols Inc, E Aurora, NY. *Mach Lloyd* 1960 Vol 32 (24A) p 42 (Nov 26)

A number of advantages are claimed for a newly developed system of machine control which uses pneumatic-hydraulic means in place of electronics. All machine functions, including indexing the turret in any sequence, operating the coolant, blowing chips, *etc*, can be controlled by this system. 1 illustr.
*D* *Pr Wp*

**Norton International hold grinding schools**

Anon. *Metalworking Prod* 1960 Vol 104 (41) p 101 (Oct 12)

The first international schools of grinding sponsored by Norton International Inc and staged by Norton Grinding Wheel Co Ltd of England were held in Sep-Oct, 1960. *D* *Chc.2235.31*

**Nondestructive testing of small tubing**

J. R. Grieve, A. M. Bounds. *Metal Progr* 1960 Vol 78 (6) pp 110-114, 126, 128 (Dec)

The article compares eight non-destructive testing methods. 3 illustr, 1 table.
*D* *Agm Cy*

**Rotating machines form new-type transfer line**

Anon. *Metalworking Prod* 1960 Vol 104 (47) p 80 (Nov 23)

To make the rate of flow of the components in the line independent of the time required for each operation, and to overcome problems in the basic design of conventional automatic lines, a new work transfer technique is reported from the Soviet Union. This principle is realized in what are called 'rotoric' unit lines. A diagram shows in principle a section of one line. *D* *Pr.142.33*

**Numerical methods of controlling metal cutting machines**

V. I. Loskutov. *Machines & Tooling* 1960 Vol 31 (7) pp 3-6 (July) (Original in Russian)

5 illustr. *D* *Bf Ceg Pr Wpb*

**Computers and production [:] An interim report**

D. E. Greene. *The Prod Engr* 1961 Vol 40 (1) pp 19-33 (Jan)

Includes a section on machine control. 12 illustr.
*E* *Pr Wp*

**When is it profitable to adopt numerical control for machine tools ?** Quando conviene adottare il controllo numerico sulle macchine utensili ?

Anon. *Macchine* 1960 Vol 15 (12) p 1185 (Dec) (In Italian)

*M* *Pr Wpb*

**Economic working with special tools and devices.** Rationelles Arbeiten mit Spezial-Werkzeugen und-Vorrichtungen

P. Gabler. *Werkstattstechnik* 1960 Vol 50 (11) pp 587-591 (Nov) (In German)

15 illustr, 3 ref. *A* *Pd/Psc*

**Conference on the use of radioisotopes in the physical sciences and industry in co-operation with the United Nations Education, Scientific and Cultural Organization (Russian papers only). Copenhagen, September 6-17, 1960**

Anon. *Battelle Tech Rev—Abstr* 1960 Vol 9 (12) p 759a (Dec) No 14020 (Original in Russian)

Twenty-two preprints of papers on sources and use of radio-isotopes in studies of wear, lubricants, chemical synthesis and reaction kinetics, thickness measurement, ore flotation, et cetera.
*D* *Vwg:Syb.231*

**Ultrahigh pressure technology**

C. M. Schwartz. *Chem Engng Progr* 1960 Vol 56 pp 71-76 (Aug); *Battelle Tech Rev—Abstr* 1960 Vol 9 (12) p 706a (Dec) No 13041

*D* *Vcb.21*

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## CORRIGENDUM

See *Industr Diam Abstr* 1960 Vol 17 p A252 (Oct)

**Surface grinding aluminium castings :**

for *Metalworking Prod* read *Metal Ind.*

# PUBLICATIONS RECEIVED

## BOOK REVIEW

**Diamonds.** Diamanten

A. Muehr. NV Uitgeversmaatschappij Pax 'S-Gravenhage, Holland. 562 pp, illustr. (In Dutch)

Material for this interesting book has been obtained from legends, folk-tales, memoirs, archives and history books. Strange stories dealing with the diamond as an ornament and as a magic stone are related. The book is of interest to the general reader, and deals with the history of diamonds from 2,000 B.C. to the present day.

*L* *F.28.52*

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## TRADE LITERATURE

**Life and work at CDM**

The Consolidated Diamond Mines of South-West Africa, Ltd. 44 pp, 6½ × 9 in., illustr

Briefly describes living and working conditions at Oranjemund, the organization of the mine and mining procedures. *D* *Ebc.362.57*

**'UNI' diamond dental instruments**

Universal Grinding Wheel Co Ltd, Stafford. 6 pp, 6 × 9 in., illustr

The range of mounted wheels and points of unmounted wheels and disks are photographed. The diamond grains used are crushed in special machinery and are graded to ensure efficient operation. They are metal bonded to the instrument in a way that ensures secure anchoring of each grain at its base. A manufacturing process is said to make the full cutting power of the instruments available for use immediately by exposing the grain tips. Other features are mentioned.

*D* *Nhf.57*

**Diacraft diamond wheels and hones, resinoid bonded, metal bonded**

Diacraft Inc, Detroit 40, Mich. 24 pp, 8½ × 11 in., illustr

Marking symbols and ordering instructions for diamond wheels and hones are given as well as specifications of resinoid and metal bonded wheels. Special wheels are available for glass, quartz, ceramics, and electrolytic grinding.

*D* *Nqe.57/Nv.57*

**Revolutionary new Torit diamond dust collector**

Torit Mfg Co, St Paul 2, Minn. 6 pp, 8½ × 11 in., illustr

The diamond dust collector is said to be the most efficient yet developed and to save 30% of the carats originally contained in the diamond grinding wheels, whether the latter are used for mist, wick, or dry grinding. The feature responsible for this performance is an exclusive centrifugal separating device. Other features are listed.

*D* *Hvm Km Pw:Hf Psc.57*

**Scherr-Tumico precision measuring tools and instruments, Catalogue No 25**

Scherr-Tumico, Tubular Micrometer Co, St James, Minn. 96 pp, 8½ × 11 in., illustr

Inspection and other tools and aids to production are reviewed, as well as Carl Zeiss-Jena precision instruments for which the company are US distributors. Types of equipment include micrometers, gear testing instruments, and optical measuring instruments.

*D* *Wbz.57*

**Universal tool and cutter grinder WZS 3**

J. E. Reinecker Maschinenbau GmbH, Einsingen/Ulm, Germany. 18 pp, 8½ × 11¾ in., illustr

Three special features are claimed to give much improved grinding efficiency with a proportionate reduction in tool costs. The new grinding head can be swivelled through 360° in the horizontal plane and the wheel can be tilted up to 90°: positioning of the grinding wheel therefore reduces setting time. The spiral pitch setting can be obtained instantly and precisely by placing slip gauges under a sine bar. The hydraulic table drive operates with the spiral grinding attachment, and also provides for hydraulic backlash compensation, thus ensuring a uniform cut in both directions, increasing output and improving surface finish. Other advantages are listed and specifications given. Photographs and diagrams show various aspects of the grinder at work. Diamonds are used in the flank dressing and the radius truing attachments.

See also *Industr Diam Abstr* 1960 Vol 17 p A196 (Aug). *D* *Al Chc Pr.57*

**Diamond impregnated metal bonded wheels and hand laps**

S. L. Van Moppes Ltd, 32/34 Holborn Viaduct, London EC 1. Folder, 5 × 8 in., illustr

Specifications are given of various types of wheel and advice is given on mounting, coolant, cleaning, speed and pressure. *D* *Nv Urc.57*

**The 'Vandia' grinding wheel radiusing fixture**

S. L. Van Moppes Ltd, 32/34 Holborn Viaduct, London EC 1. 1 p, 8 × 10 in., illustr

A leaflet with instructions for setting up the fixture, which can generate a male radius of ¼ in. maximum and a female radius of 3 in. maximum with a wheel up to 9 in. diameter. The Vandia may be used on the grinder by the usual method of clamping along the machined sides of the base or on a magnetic plate. The diamonds chosen for general radii forming are carefully selected natural pointed stones with the correct grain orientation to insure maximum life. The use of special chisel-type diamonds of 40° and 60° in the finer female radii, or, if the radius to be generated is specially small, a Gram Point diamond is recommended. *D* *Ab Cg Nj Psfc.57*

**Springfield vertical universal grinders**

The Springfield Machine Tool Co, Springfield, Ohio. 8 pp, 8½ × 11 in., illustr

These grinders, designed to utilize the natural force of gravity to the utmost, are claimed to combine micro-in. finish with economical operation and versatility with high production. The face plate on which the workpiece is set rotates as necessary and the grinding spindle, which can be swung through an arc of 90° and raised or lowered, reaches any surface to be finished except the bottom surface. Spindle and grinding head can be adjusted to accommodate virtually any shape. All models are fully hydraulic in operation and have a wide range of work table and grinding spindle speeds. The grinding spindles are interchangeable. The larger machines are made in crown or cross rail types. A diagram shows the many jobs possible on one chucking. Special equipment can be designed to meet problems in other types of vertical grinding. General specifications are given.

*E* *Chc Prx*

**Collected catalogues**

Norton Grinding Wheel Co Ltd, Welwyn Garden City, Herts.

The cool, fast cutting properties of 32 Alundum abrasive are said to be ideal for Norton Mounted Wheels and Points. Revised standard stock specifications are given. Groups 'A', 'B', and 'W' tools are illustrated on a chart and advice is given on safety and correct operation.

*D* *Peh Rj.57/Pez Rj.57*

**ACC American Coldset Corp. Diamond wheels and hones**

American Coldset Corp, Teterboro, NJ. 28 pp, 8½ × 11 in., illustr

Resinoid, metal, and vitrified bonded diamond wheels and hones are specified and advice is given on care and use. Diamond files, a diamond plated cup wheel, and mounted diamond points and wheels are also covered. Every 100 concentration diamond wheel has 75 ct/cu. in. and 100% of the carats ordered are stated to be utilized in cutting.

*D* *Nqe.57/Nv.57*

**Harig grind-all fixture**

Harig Mfg Corp, 5751 W Howard St, Chicago 48, Ill. 4 pp, 8½ × 11 in., illustr

Said to save time and increase accuracy in grinding irregular shaped perforators, the fixture is built for high precision work within ±0.0001 in. and can be adapted to grinding a variety of shapes and for light milling, indexing, jig boring, inspection, et cetera. An attachment which converts it to radius dressing is machined so that the opening for the diamond is exactly at the centre of the fixture. Various features of the fixture are illustrated.

*D* *Chc Pr Psc/Chc Pr Psfc:Nj*

**Collected catalogues**

Protolite Ltd, Rainham, Essex.

Give specifications of tungsten carbide wire, tube, and bar drawing dies and other dies and tools.

*E* *Px.57*

**Automotive machine SCHOU shop equipment**

Stedall Machine Tool Co, 192-208 Pentonville Rd, London N 1. Folder, 5¼ × 8¼ in., illustr

Gives specifications of the company's range of grinding, honing and boring machines for use in the manufacture of crankshafts, cylinders, and conrods, et cetera. *E* *Agn Ceq Pr.57*

**Lorch lathes**

British Rep: Adam Machine Equipment Ltd, 4 Grange St, St Albans

Illustrates and gives specifications of this range of high precision lathes for work on fine instruments and watches.

See also *Industr Diam Abstr* 1960 Vol 17 p A298 (Nov). *E* *Ceqb Pr.57*

**Diaform Model 12**

L. M. Van Moppes & Sons (Diamond Tools) Ltd, Basingstoke, Hants. Leaflet, 8 × 10 in., illustr

The Diaform Model 12 truing device has been developed for use on large cylindrical grinders, centreless and thread grinders, and other special purpose machines. A set of diamond tools for roughing out new wheels is supplied with Diaform as standard equipment. Also described are the standard and modified carriage units for mounting the device.

*E* *Nj Psf.57*

**Toric ophthalmic lens grinding machine**

Adcock & Shipley Ltd, Ash St, Leicester. 1 p, 8½ × 11 in., illustr

The machine is specially designed for generating toric surfaces of opthalmic lenses by an impregnated diamond wheel grinding on its periphery and mounted on a vertical spindle running at 6,000 rev/min, *ie* the recommended cutting speed for glass. Accuracy of curve is said to be assured by machine rigidity, the principle of generation, and the fact that no tools are used which would wear and thus cause errors. Setting up, method of generation, *etc*, are briefly explained and a photograph shows various parts in close-up. Approximate principal dimensions are given. Extras include spare diamond wheels.

*D* *Bm Chcs Nv Tfbc.57*

**Collected catalogues**

G. W. S. Burdett & Co Ltd, Eastgate, Peterborough.

Special features of models 70 and 75 precision surface grinders include a Nitralloy grinding spindles of advanced design, said to permit a very heavy cut combined with extreme accuracy and excellent surface finish. Rigidity allows full advantage to be taken of wide wheels on forming and crush grinding techniques. Cross-feed can be manual or automatic. A built-in wheel dresser, reported to reduce dressing time considerably on repetition work, is among extra equipment available.

Model 77 is the latest in the range and was designed with a sufficiently wide cross-traverse to grind dies and press tools. All design features are identical with those of model 75. *D* *Chcm Pr Psf.57*

**Jung F 50 RD + Diaform**

K. Jung GmbH, Goeppingen, Germany. 4 pp, 8¼ × 11¾ in., illustr

This precision surface and profile grinder, specially designed for toolroom production, is available with various kinds of clamping tables, and truing and crushing attachments for profile grinding wheels of the many forms needed in cutting tool production. The Diaform Model 5/1, considered here to represent the most highly developed mechanical forming instrument for machining irregular profiles, is incorporated in the grinder. High accuracy of form is insured by a transmission of 10 : 1 in conjunction with carefully prepared control templates. The Diaform is mounted in position for immediate operation and as it is unnecessary to adjust the grinding wheel vertically for re-truing the profiles, the grinding wheel is also constantly in operating position. Variable-speed drive enables infinitely variable regulation of grinding spindle speed between 1,000 and 4,000 rev/minute. Grinding spindle head can be adjusted vertically, appropriate height being controlled on a vernier scale. Other features are described and photographs include a view of the Sine Bar Magnetic Clamping Table.

*D* *Chch Pr Psc.57/Chcm Pr Psc.57*

**Diamond imports via London, Antwerp, Amsterdam for diamond tools for truing, boring, turning, grinding and testing**

Wilhelm Saettele, Diamantwerkzeugfabrik, Berlin-Steglitz, Wilsederstr. 8-10, Germany. 4 pp, 8¼ × 11¾ in., illustr. (In German)

This leaflet gives specifications of the firm's tools, which include those for truing and profiling, Vickers hardness testing, tools for working metals and natural and synthetic materials, lathe tools, and tools for such specialized work as engraving, boring, and working on paper, porcelain and rubber bearings.

*A* *F.251.57/N.254.57*

**Speedet drill conversion sleeves, adjustable adaptors, radius truing dresser**

R. G. Boardman Tools Ltd, Benson Rd, Soho, Birmingham 18. 16 pp, 7¼ × 8¼ in., illustr

The radius truing dresser will produce convex and concave radii up to 3½ in. or metric equivalent. The method of setting the diamond is explained. Correct generation of elliptical shape can be ensured with the tilting Radius Fixture ; technique is described.

*D* *Nj:F Lb.57/Nj Psfc.57*

**'Cutglas' diamond wheel brilliant cutting machine**

Cutrock Engng Co Ltd, 35 Ballards Lane, London N 3. 1 p, 8 × 10¼ in., illustr

The standard diamond wheel is 10 in. diameter × 1½ in. bore but the machine is suitable for use with diamond and other abrasive wheels of various diameters. Wheel dressing is by a power driven unit, detachable when not in use. The machine is suitable for all types of glass tableware.

*D* *Bm Ceg Nv Pr Psf.57*

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# PATENT LISTS

## BRITISH

*The Official Journal (Patents) 1960 (3746) (Nov 30)*

859,650 H. J. STRUNCK. Grinding machine, particularly for grinding the rims of spectacle lenses.

859,767 CINCINNATI MILLING MACHINE CO. Truing mechanism for grinding machine.

*The Official Journal (Patents) 1960 (3747) (Dec 7)*

860,118 AGIE AKTIENGESELLSCHAFT FÜR INDUSTRIELLE ELEKTRONIK. Method and arrangements for detaching material by spark erosion.

*The Official Journal (Patents) 1960 (3748) (Dec 14)*

860,609 ROLLS-ROYCE LTD. Drilling of holes by spark erosion.

860,664 SUPER-CUT INC. Method of and apparatus for dressing grinding wheels.

860,764 SKANDINAVISKA GRANIT AB. Saw blades for stone sawing machines provided with hard metal cutters.

860,768 SOC D'ELECTROCHEMIE D'ELECTRO-METALLURGIE ET DES ACIERIES ELECTRIQUES D'UGINE. Method of manufacturing rock and like drills and such drills.

860,429 NORTON CO. Flexible coated abrasives.

860,555 LONGYEAR CO, E. J. Apparatus for core drilling in earth formations.

*The Official Journal (Patents) 1960 (3749) (Dec 21)*

861,292 H. FEHLMANN. Apparatus for cutting hard materials.

860,925 REVERE CAMERA CO. Adjustable lap for the manufacture of precision lenses.

861,039 HAMMOND MACHINERY BUILDERS INC. Rotary vice for an electrolytic grinding machine.

## UNITED STATES

*Official Gazette 1960 Vol 760 (1-5) (Nov)*

2,958,164 F. K. BEYER, W. BADER, WESSON CO. Grinding machine.

2,958,240 A. R. SEGALL, NORTH AMERICAN PRODUCTS CORP. Method of grinding reliefs on cutters.

2,958,323 N. L. KNOPH, J. B. JONES jun, TY-SAN-MAN MACHINE CO. Stone cutting apparatus.

2,958,593 H. L. HOOVER, E. J. DUPRE, W. J. RANKIN, MINNESOTA MINING & MFG CO. Low density open non-woven fibrous abrasive article.

2,958,984 J. R. HOPKINS, W. E. SYKES LTD. Machines for grinding gears and similar profiles.

2,958,985 M. D. MAHONEY, PERFECT CIRCLE CORP. Rail-lapping machine.

2,958,986 E. J. KRACK, GULF RESEARCH & DEVELOPMENT CO. Apparatus for grinding a magnetic signal transducing head.

2,958,988 S. CROSBY. Tool grinding machine.

2,959,348 H. NASSENSTEIN, FARBENFABRIKEN BAYER AG. Apparatus for the automatic counting and determining particle size distribution.

2,959,474 R. S. DANIELS, A. J. MOSTELLO, UNION CARBIDE CORP. Abrasive bond.

2,959,507 B. LONG, GLACES DE BOUSSOIS SA. Method for cleaving glass sheets and new articles of manufacture thereby obtained.

2,960,392 G. L. BIBBINS, NORTON CO. Metal bonded grinding wheel.

2,960,759 R. J. BONDLEY, GENERAL ELECTRIC CO. Method of manufacturing phonograph styli.

2,960,804 S. G. BRADY, EX-CELL-O Corp. Machine for grinding the back-off from the cutting edges of tools of the broach type.

2,960,909 R. M. SHIPLEY. Method for determination of colour of gems.

2,960,978 F. DUSTAN, FITCHBURG ENGNG CORP. Machine for sawing crystals and other hard materials.

2,961,325 M. J. MAYFIELD, AMERICAN LAVA CORP. Cermet bodies.

2,961,356 D. BREESE, F. B. VAVRINEK, WESTERN ELECTRIC CO. Method of reclaiming diamonds from industrial metal tools.

2,961,750 H. BENDER, SYLVANIA ELECTRIC PRODUCTS INC. Bonding process.

2,961,808 F. P. DUNIFAN, MACHINERY ELECTRIFICATION INC. Machine tool with load control.

2,961,871 J. B. RICKS, E. F. SIMMONS. Surface testing apparatus.

2,961,908 H. F. VILLALOBOS. Microtome.

2,962,577 R. S. WEBB, ELOX CORP. Electrical discharge machining method.

## SOUTH AFRICAN

*Official Journal 1960 Vol 13 (44-47) (Nov)*

59/2558 H. H. SCHLOSSIN, HARD METALS LTD. Rock drill bits.

60/1876 P. L. TEMPLE, ICI of AUSTRALIA and NEW ZEALAND LTD. Rock-drilling apparatus.

## SWISS

*Patentliste 1960 (19-20) (Oct)*

349,503 EX-CELL-O CORP. Grinding machine.

349,533 L. MINIATI. Equipment for sawing blocks of stone.

349,717 W. EHRLICH, W. ULLMANN, AG FÜR INDUSTRIELLE ELEKTRONIK AGIE. Electroerosive grinding method and machine for carrying out the method.

349,862 A. L. A. VARAND. Device for centering and drilling with precision to be mounted on a precision lathe.

349,864 L. C. HAMMOND, HAMMOND MACHINERY BUILDERS INC. Sawing machine.

349,899 H. P. V. ALLENBACH. Machine for cutting spectacle glasses.

349,917 C. A. TAYLOR, RAWPLUG CO LTD. Drilling head for rotary drilling machines.

## FRENCH

*Bulletin Officiel 1960 Vol 1 (45-48) (Nov-Dec)*

1,246,441 SOC PETER WOLTERS. Lapping machines with two lapping wheels.

1,246,330 R. CHERREAU, G. J. H. LE BOULBOUECH. Method of sawing stones and sawing installation for carrying out the method.

1,247,614 H. SCHUMACHER, TRENNSCHLEIF-JUNGBLUTH KG. Cutting-off machine and rotary cutting-off disk.

1,247,374 A. GILBERT. Mounting means for polishing wheels, called felting disks, and disks for carrying grinding wheels for hard materials, in particular granite and marble.

1,247,357 E. E. FLUSKEY, H. U. BRUECKNER, REVERE CAMERA CO. Lapping device with compensation for wear for grinding and polishing optical glasses.

1,248,154 M. L. SPIRA, NEE KLEIN. Machine for drilling hard materials.

1,248,330 F. UNGERER. Machine for grinding cylindrical surfaces or the like.

1,248,003 D. CATALLO, LAMINOIR SA. Plastic foil for polishing metallographic specimens.

## GERMAN

*Patentblatt 1960 Vol 80 (46-50) (Nov-Dec)*

**Applications Open to Public Inspection**

1,093,251 K. HACK. Truing device for the faces of grinding wheels for grinding machines for the ends of springs.

1,093,252 W. BECKER, O. FRITZ. Tool for grinding the interior and exterior conical bearing faces on apparatus made of glass, quartz or the like.

1,093,692 W. LADINSKY. Cutting tool, in particular for truing grinding wheels.

1,094,145 A. HENKE, MASCHINENFABRIK oHG. Machine for grinding plane natural and artificial plates.

1,094,146 F. DÖLL, SCHNELLPRESSENFABRIK KOENIG & BAUER AG. Grinding machine for centreless grinding and for grinding between centres.

1,094,147 C. KLINGSPOR. Device for cutting off by grinding strong and or resistant workpieces.

1,094,178 P. W. BLACKMER jun, DEUTSCHE NORTON GmbH. Grinding wheel, in particular diamond grinding wheel with sintered metal bond.

1,094,384 M. BRUMA, M. MAGAT, CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE. Circuit arrangement for spark erosion with means for preventing arc discharge.

1,094,484 F. HOCK, ERNST LEITZ GmbH. Interference device for producing diffraction gratings.

1,094,547 H. GOETZELER, SIEMENS & HALSKE AG. Method for electrolytical removal of limited areas of conductive and non-conductive materials.

1,094,555 P. F. BARKER, GLEASON WORKS. Gear wheel grinding machine, in particular straight or helical bevel gear wheels with greatly differing diameters.

1,094,623 A. LAMESCH, CIE DE SAINT-GOBAIN. Device for feeding the abrasive on glass grinding machines.

1,094,624 K. H. SCHULTZE, O. JAECKEL, FA HERBERT LINDNER. Device for the automatic compensation of the grinding wheel wear by a predetermined truing tool advance.

1,094,687 H. HUGEL, TIEFBOHR-MESS-DIENST LEUTERT U HUGEL, GmbH. Core drill for obtaining oriented cores in which portions are oriented independently of each other.

1,095,082 L. A. SAYCE, NATIONAL RESEARCH DEVELOPMENT CORP. Machine for producing a helix of great accuracy in a cylindrical workpiece.

1,095,159 H. DIECKMANN, KUGELFISCHER GEORG SCHAFER & CO. Truing device for a centreless grinding machine.

**Patent Granted**

974,480 H. KATTWINKEL, JURID-WERKE GmbH. Device for grinding plane and slightly tapered workpieces, in particular annular clutch linings.

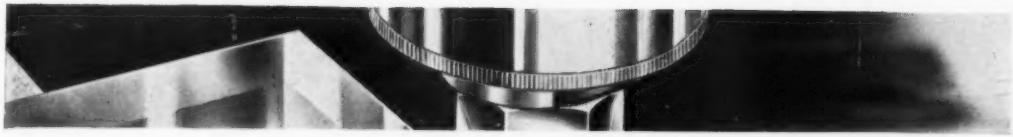
## AUSTRIAN

*Patentblatt 1960 Vol 57 (10-12) (Oct-Dec)*

212,666 TH CALOW & CO. Cutting body.

213,074 AB SVENSKA METALLVERKEN. Method for making metal-ceramic materials.

213,198 NV PHILIPS' GLOEILAMPENFABRIEKEN. Method for making an article equipped with a diamond, in particular a diamond needle for gramophones.



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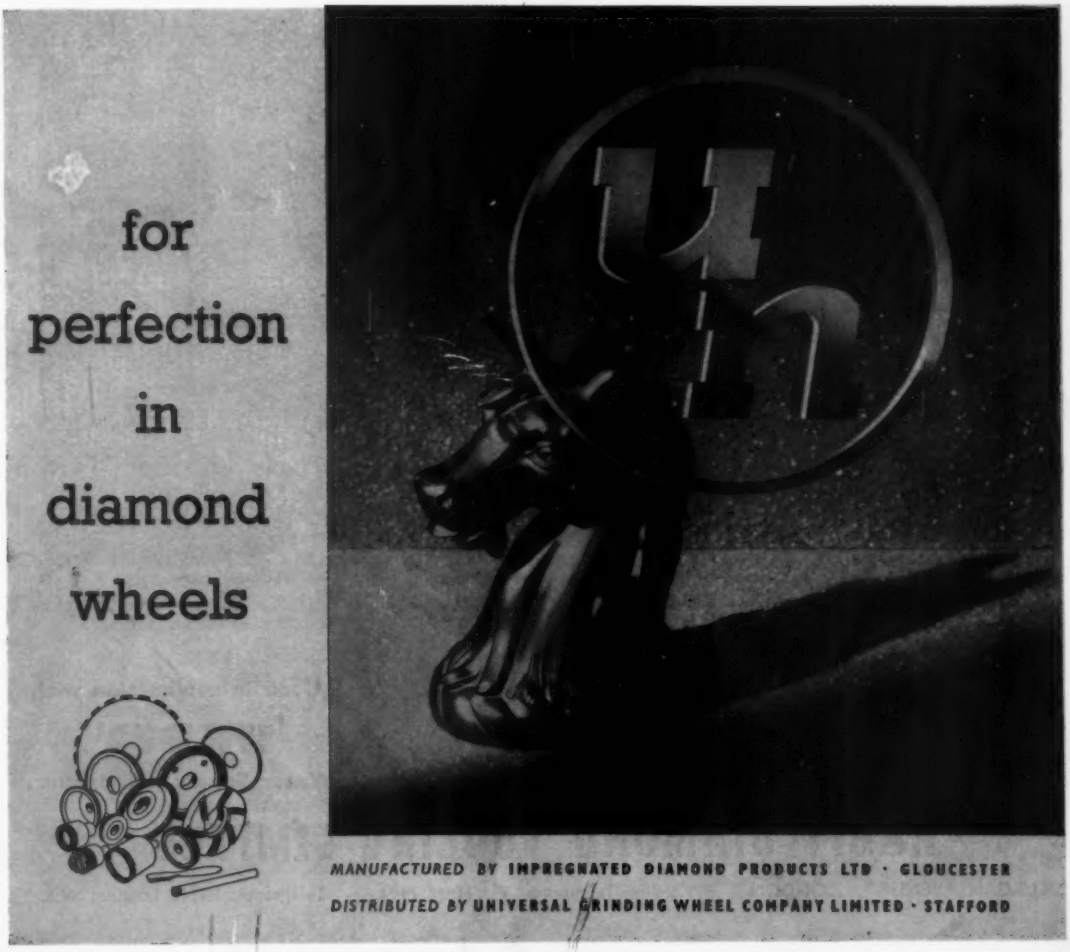
# INDUSTRIAL DIAMOND REVIEW

incorporating INDUSTRIAL DIAMOND ABSTRACTS

MONTHLY 1/3 SUBSCRIPTION 15/- A YEAR

February, 1961 Vol. 21 No. 243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